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REMOTE STORAGE

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THE

AMERICAN TELEPHONE

JOURNAL

PUBLISHED EVERY SATURDAY

REMOTE STORAGE

VOLUME VIII. Numbers 1 to 26

From July 4 to December 26, 1903

New York
116 Nassau Street

Chicago
Monadnock Building

INDEX TO VOLUME VIII.

THE AMERICAN TELEPHONE JOURNAL

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The American Telephone Journal

VOLUME VIII SATURDAY, JULY 4, 1903 NUMBER 1

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THE TELEPHONE AND THE HOSPITAL

By W. Clayton Traverst.

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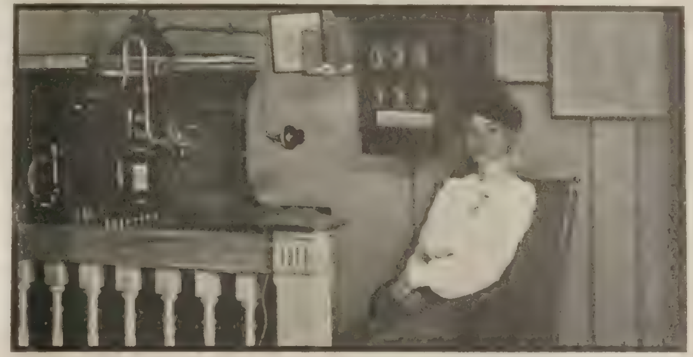
The New York Hospital.

IN a large city hospital where time is almost as important a factor as it is on a railroad system, the telephone finds a sphere of usefulness peculiar to itself. It is hard in this day to see how in the times past the hospitals were able to get along with their bulky systems of speaking tubes and call bells.

Every hospital of any size which is under construction or which has lately been constructed has a telephone system, which is more or less elaborate. Some of the systems installed are of the inter-communicating type, where the subscriber does his own connecting, while others, more extensive, have as perfect a complement of apparatus as a good exchange in a small town. In these there would be a telephone in each ward, office and department, so that in an institution of any size it is evident that the number of substations would easily approach the hundred mark. Where a system as extensive as this is found necessary, the intercommunicating telephone is out of the question, and a switchboard has to be used and an operator employed. Each circuit from any telephone where the switchboard is used terminates in a jack at the switchboard just as in a small town. The operator would perform the operation of connecting the substations.

Such a system as this is in operation at the New York Hospital which is located on West Sixteenth street, between Fifth and Sixth avenues. This is one of the older hospitals of the city, but its progressive management is quick to appreciate time and labor saving devices and keeps the entire hospital equipment thoroughly up to date.

Here two switchboards are installed, in the main office. They are close together, so that one operator can easily handle both of them. There is no intercommunication between the switchboards. One is connected by 5 trunk circuits to the Eighteenth street exchange of the New York Telephone Company, and has 9 extensions going to different offices and departments in the hospital. The other switchboard is used for purely local work and has on it drops representing all the offices, and wards in the hospital besides those attached to lines which go to the engine room, kitchen, dining rooms, nurses' reception room, operating rooms and to other departments of the hospital. On this board also terminates a circuit which comes directly from the police headquarters and over which any precinct police station or hospital can be reached if necessary. The "police wire," as it is called, is used mainly, however, for the transmission of ambulance calls. All calls for the ambulance are taken directly from police headquarters, to which point the call is telephoned from the precinct in which it originated. Each hospital in the city has arranged to give ambulance service to a certain precinct. When an ambulance is wanted in that precinct, the request is telephoned to police headquarters, from which point the call is telephoned to the hospital which is serving that precinct. Each hospital has a direct circuit to the police headquarters. When an ambulance call comes into the hospital the location of the point at which the ambulance is wanted is written on a slip. A button is pressed which sounds an alarm in the ambulance surgeon's room and also in the ambulance stable. The ambulance, which is driven by electricity, is immediately run around to the front of the building. The surgeon on his way out gets the direction slip, and in less time than it takes to tell it they are on their way.



Switchboards, New York Hospital.

The other circuits to the different wards and departments

Telephone in One of the Operating Rooms.

Telephone in the Pathological Laboratory.

around the hospital are used in a variety of ways. A great many inquiries come in each day over the city exchange telephone as to the condition of some patient. The operator, who is always stationed at the boards, can without changing her position call up the ward in which the patient is and from a nurse immediately find out his condition. The operator can give the information to the inquirer and the performance is finished. How much better this is than the old way, when it was necessary to send a messenger up several flights of stairs or in a slow elevator, and even when he returned, the inquirer had no assurance that the message was delivered to him, as the nurse gave it to the messenger. With the present system only a fraction of a second elapses between the time of the nurse's report and the delivery of the report to the party on the telephone. The chance for error is slight.

Telephone in one of the Men's Wards.

It is quite essential that a bright, obliging operator be employed for a position of this kind. A great deal depends on her. She has to have the names of the hospital staff at her tongue's end, and know where to locate them quickly. In fact, she has to be a general information department for the whole hospital, as all questions that come over the telephone reach her before they go any further.

When a prospective patient applies for admission to the hospital the application is made to one of the superintendent's assistants. He directs the switchboard operator to summon a physician to make an examination. She gives the summons by telephone and the doctor comes from his room to the main office. The patient is then taken into one of the examining rooms, which are close by, and the examination is made. This done, a report of the patient's condition is made to the office and the proper ward is assigned. A nurse is then asked over the telephone to come and assist the patient to the ward. Straight through the daily routine of the hospital the telephone saves time and energy, and here, as in all other places, if we had to do without it, after having become so dependent on it, the outcome would be hard to predict.

CUTTING A TELEPHONE EXCHANGE FROM MAGNETO TO COMMON BATTERY*

By W. C. Boyer.

ONE of the features of telephone engineering is the transferring of a telephone system from an old magneto board to a switchboard built for common battery service. It will be imposible to describe in detail all the circuits that are used; they will be described only sufficiently for a thorough comprehension of the engineering features of the work. The lines entering a telephone exchange are of two general classes. Those connecting the subscriber stations with the exchange, called subscriber lines, and those connecting one exchange with another, called trunk lines, or "trunks." In Fig. 1 is shown the nature of the wiring of a subscriber line used with the magneto system; the circuit is shown, much simplified at the central office end, and the wiring of the operator cord circuit is not given. Looking at the operating room, the jack, by means of which the operator is given access to the line, is shown at *A*, and the drop, or signal, by means of which the subscriber calls the attention of the operator is shown at *B*. It has its counterpart in the drop used on annunciators but is of special design, being permanently bridged across the line. This drop has a resistance of 600 ohms to prevent the transmission current being shunted materially. From the jack the line runs to the switchboard side of the main distributing frame *C* an iron frame-work equipped on one side with the lugs to which are soldered the wires coming from the switchboard, and on the other side with lugs for soldering the wires which enter the exchange from the outside. By cross-connecting from the proper lugs on one side of the rack to those on the opposite side, the circuits are completed from the switchboard to the outside lines. To the extremity of the line is connected the subscriber telephone *D*, which is made up of four pieces of apparatus, each with its special office to fill. They are: The magneto generator *E*, for transmitting a signal to the central office. A bell *F*, for receiving a signal from the central office. A transmitter, *G*, for transmitting sound to the distant end of the line. A receiver *H*, for receiving sound transmitted from the distant end of the line. The auxiliary apparatus consists of a hook switch *I*, the induction coil *J*, and the transmitter battery *K*. The method of operation of the subscriber telephone is as follows: The subscriber desiring to call, turns the crank of the generator causing an alternating current to flow over the line and through the drop coil at the central office, with the result that the shutter of the drop falls. This attracts the attention of the operator. The operator introduces the plug of one of her cord circuits, which, for simplicity's sake, is not shown, and thus puts herself into communication with the subscriber. The receiver having been removed from the hook switch, upon which it rests when the telephone is not in use, the latter being actuated by a spring rises and makes contact with the points 1 and 2, closing the following circuits. From one of the jack

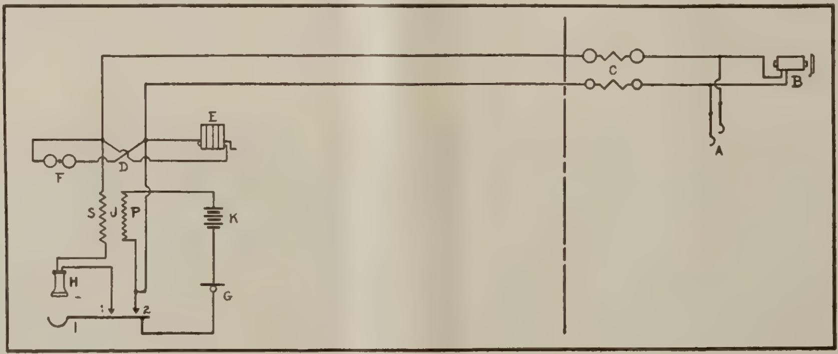


FIG. 1

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*Paper read before the Brooklyn Engineers' Club.

springs at the exchange, along one side of the line to the left-hand binding posts of the telephone, thence through the secondary winding *S* of the induction coil to the receiver, through which it passes to contact 1. At this point the circuit is closed through the metal of the hook switch, to contact 2, and thence to the right-hand binding post, from which it returns to the central office over the opposite side of the line. This circuit is for receiving the transmission from the other end of the line. The transmitting circuit includes the battery, the primary winding *P* of the induction coil and the transmitter; and is closed through the metal of the hook switch at the contact point 2. When the receiver is placed on the hook switch, the latter is depressed and both these circuits opened. The armature circuit of the generator is normally open, and is equipped with a device for automatically closing its circuit when the crank is turned. By this means, neither the transmission current nor the current used to signal from the central office is shunted. Neglecting the current used for signalling, which is demanded only for short periods, the line is subjected to no potential, except that of the tranmission current, which is very feeble. During the time that the telephone is idle there is absolutely no potential on the line. This feature is essential and constitutes one of the distinctive points of difference between the old magneto or local battery system and the new or common battery system.

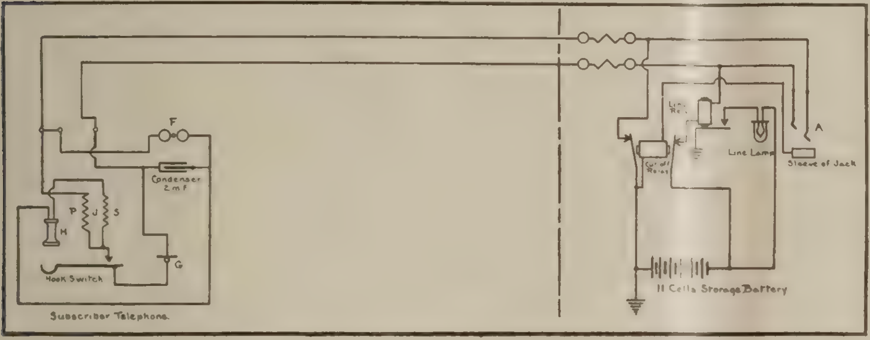


FIG. 2.

In Fig. 2 is shown the wiring of a subscriber line used in connection with the new or common battery system. In looking at this circuit it will be seen that the generator and tranmitter battery have been removed from the subscriber telephone, and that the wiring at the exchange end has been made complicated. A battery, consisting of 11 storage cells, is conected to the line through the contact springs of an electric magnet called "the cut-off relay." The other side of the line passes through the winding of a second electric magnet called "the line relay." At the subscriber telephone, a condenser of 2 M. F. is wired in a series with the bell, so that when the receiver is on the hook switch, the line is open to a direct current, while the bell will respond to the ringing current. Therefore when the terminals of the storage battery are connected, through the contacts of the cut-off relay to the line, it is subjected to its potential, but no current flows. When the subscriber removes the receiver from the hook, the line is closed, through the primary winding of the induction coil, the contact at the hook switch, and the transmitter; and current from the storage battery flows, with the result that the line relay is energized, and its armature being drawn up against the contact point closes an auxiliary circuit in which is included the line lamp. Also current from the storage battery energizes the transmitter at the subscriber's station, making transmission possible. When the operator plugs into the jack to answer the call, the crank of the plug to which battery is connected makes contact with the ring of the jack, allowing current to flow through the coil of the cut-off relay. The cut-off relay being energized, its contacts are broken and the direct battery is taken off the line. For transmission purposes the current is fed to the subscriber station from the operator's connecting cord circuit. Contrary to the condition with the magneto system, the insulation of the lines is subjected to the stress of the 24 volts of the storage battery. This is more intensified by the fact that one side of the battery is grounded, thus making the side of the line connected to this particular terminal a "solid ground."

With the old magneto system the presence of defective insulation on a line does not seriously interfere with transmission, until it reaches the point where earth induction is introduced. Further, mechanical injury is the only agent capable of aggravating a defective spot. With the common battery system, the presence of a defective spot in the insulation is followed by a leakage of current, more or less pronounced according to the degree of defectiveness, which is sure to deteriorate the insulation, and by means of electrolytic action, eat away the wire, so that it finally breaks.

There is another feature about the common battery system which renders it particularly susceptible to defective insulation. It has been shown that the flow of current over the line from the exchange energizes the line relay, and lights the line lamp. If the insulation should deteriorate, so that sufficient current to energize the line relay leaks, the line lamp will remain lighted, so that it is impossible for the subscriber to signal the operator.

Evidently before a district can be successfully operated under common battery, the insulation must be brought to as high a point as possible, but whatever work is done on the lines in service, must be performed in such a manner as not to interfere with subscribers; and ingenious devices have to be constructed to accomplish this end.

The first thing is to make a thorough test of the insulation of all the lines, to locate defective points. This test should be made during or directly after rain storms, so that the conditions will be the most disadvantageous. A convenient method of testing insulation is to connect one terminal of a portable voltmeter, having as high a resistance as possible—usually a Weston portable voltmeter with a resistance of 16,000 ohms—to the positive leg of the Edison three-wire circuit, and the other terminal to the lines in connection. The current flowing through the voltmeter will be that which leaks through the insulation; and the insulation resistance will be given by the following formula:

$$R = \frac{E - e}{e} r$$

in which *R* denotes the insulation resistance in ohms; *E*, the effective E. M. F. between the positive and neutral of the Edison circuit; *e*, the reading of the voltmeter; and *r*, its resistance. Since, as has already been shown in connection with the magneto system, the lines are normally closed, so no test can be made of the insulation between the two sides of a circuit, but only of the two sides in parallel, to ground.

As defective lines are discovered they are reported to the maintenance department, and the trouble is cleared. After the trouble has been cleared a thorough test is again made. In making this second test, it will invariably be found that a number of lines that have shown good on the first test show defective in the second. This is due to injury and deterioration of the insulation between the tests.

In the meantime a force of instrument setters is sent out to prepare the working telephones, which are of the magneto type for the introduction of the new system by cutting a 2 M. F. condenser in series with each bell. In doing this work, care must be taken to place the condenser in the bell circuit only, and not in the receiver circuit. For if the condenser be cut into the line circuit, it will be continually open, whether the receiver be off or on the hook; and the subscriber will therefore be unable to call the central office. Each line must be tested out as the wiring is finished, and to this end the following circuit devised by the author, has been found to be successful: In Fig. 3 a telephone, preferably of the cabinet desk type, so that the man testing will

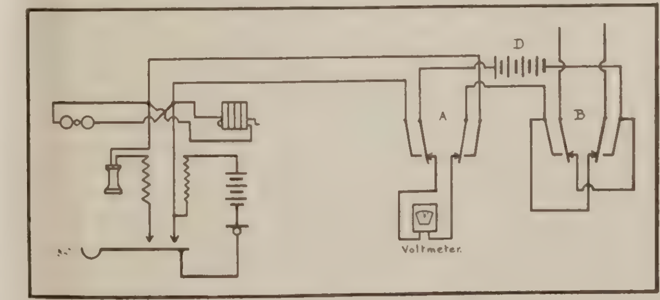


FIG. 3.

(*Continued on page 10.*)

COMPOSITE CIRCUITS—ARTICLE II.

By Arthur Vaughn Abbott.

TWO diagrams of duplex systems are shown in Figs. 5 and 6 which are sufficiently self-evident to render further description unnecessary. In all cases where duplex circuits are operated, grounded subscribers must be connected through a repeating coil, or else so much unbalance will occur as to render all circuits inoperative, and it is also necessary to so arrange each circuit so that not only is each side of each individual circuit perfectly balanced, but the respective lines must be balanced with reference to each other.

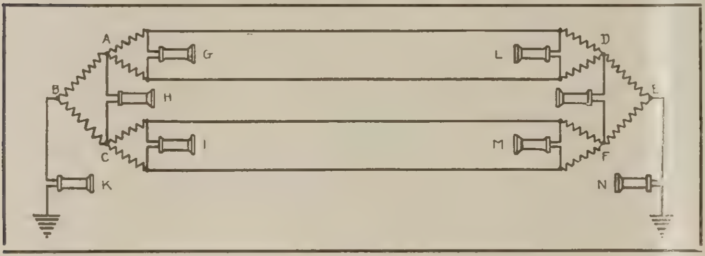


FIG. 7.

It is not difficult to imagine an almost indefinite extension of such a system of duplexing. The next step is shown in Fig. 7 in which two pairs of wire are arranged to provide three metallic circuits and one grounded circuit. The principles involved are exactly the same as have already been described, but it is necessary to recollect that as duplexing is increased the difficulties encountered in proper balancing and in maintaining the requisite line insulation are multiplied, and presently these troubles become so formidable that it is rarely expedient to carry duplexing further than to produce three metallic lines from two circuits and never beyond the artifice shown in Fig. 7.

Experience has shown that vibrations to affect the human ear as sound must be comprised within certain definite limits of frequency thus the ear does not perceive sound vibrations which are less than 16 per second, nor those which have a greater frequency than about 40,000. It would therefore be perfectly conceivable to have alternating electric impulses so swift that they should be applied to the telephone and yet produce no sensation of sound. At the other extreme, vibrations may be made so slow that they will not audibly affect the diaphagm in the receiver. We know that when a source of electro-motive force is applied to a conductor that it takes a very short, though perfectly measurable time, for the conductor to become electrofied, and that the length of time thus occupied depends upon the resistance, the capacity and the inductance of the line. The greater these quantities the longer the time required for the current to rise to its full value. If a telegraph instrument be connected to a telephone line, every time the key is depressed a current wave flows into the line through the coils of the receiver, producing therein a click which corresponds exactly to that produced by the sounder. Now if the flow of battery current produced by the key could be made so gradual that the pull on the diaphragm could not affect the ear, it is evident that one could telegraph and telephone simultaneously over the same line. By the introduction of condensers and retardation coils in such a manner as to greatly retard the rise of the current from the battery produced by the closing of the key, this result may be achieved. The arrangement of apparatus is diagrammatically shown in Fig. 8. *A B* is a line wire equipped at one end with the telephone station *T* and a telegraph station *W*. It proceeds in the direction of *A B* to similar stations at the other end. In the illustration the telephone line is shown grounded, but it will be evident through the succeeding description that a metallic circuit could be used with equal efficiency. At point *C* a condenser is inserted. This condenser offers little or no opposition to the transmission of telephone currents, but prevents entirely any flow from the batter *B*, through the telephone *T* and to ground. At the point *X* a branch circuit is legged through the retardation coil *R*. From this coil the circuit extends to the centre of the key *K*. The rear contact of this key passes through the sounder *S* and to ground. The center of the key passes through the condenser C' and the battery *B*, while the forward contact of the key passes through the retardation coil R' and to the battery B. Consider now the operation of this circuit; normally the key is on the rear contact *K*. Under these circumstances telephone currents originating in *T* will pass along the line *A B*, but the retardation of the coil *R* is so great that little of the energy of the telephonic currents is shunted to ground, and consequently the telegraph station *W* does not interfere in any way with the ability of the station *T* to talk and to receive conversation. Let us see now whether the operation of the telegraph station *W* can produce a noise in the telephone station *T*. Suppose the key *K* to be depressed upon its front contact current from battery *B* will flow through the retardation coils R^1 and *R*. But no current will flow through the telephone *T* because the condenser *C* opens the circuit to direct current. It can, however, charge the condenser *C* and if this is done suddenly the telephone *T* will emit the customary click, but in the path of this current are two retardation coils *R* and R', and also the condenser C'. Now by the properly proportioning the retardation and the condensers, the current impulses produced by depressing the key may be made so slow that the telephone *T* is unaffected. It is quite obvious that such an arrangement could not be used for any of the more rapid mechanical forms of telegraphy, but it answers very well where the business transacted can be handled by the ordinary Morse instruments. Fig. 9 shows an extension of this system in which the telephone line is represented as a metallic from which two telegraph instruments are legged, one upon line 1 and one upon line 2. By this means we have produced three circuits from a single metallic circuit. The telephone line remains completely metallic and in good condition for conversation, while two grounded telegraph lines are produced in addition.

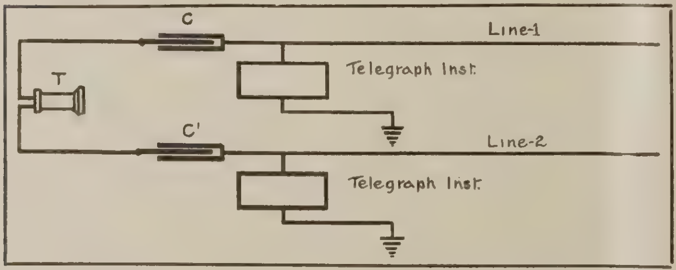


FIG. 9.

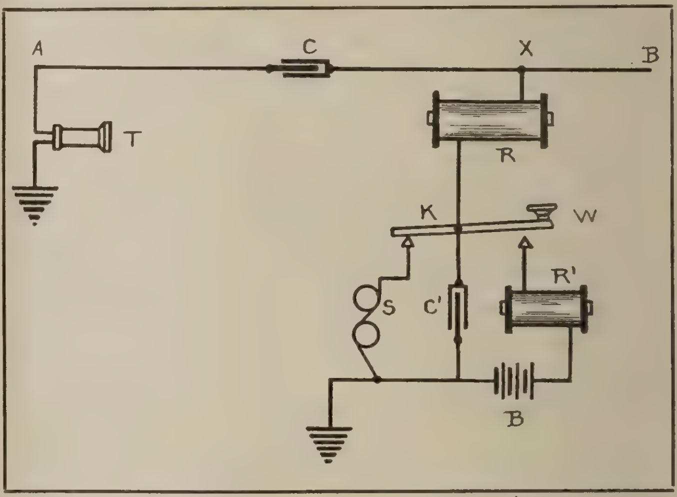
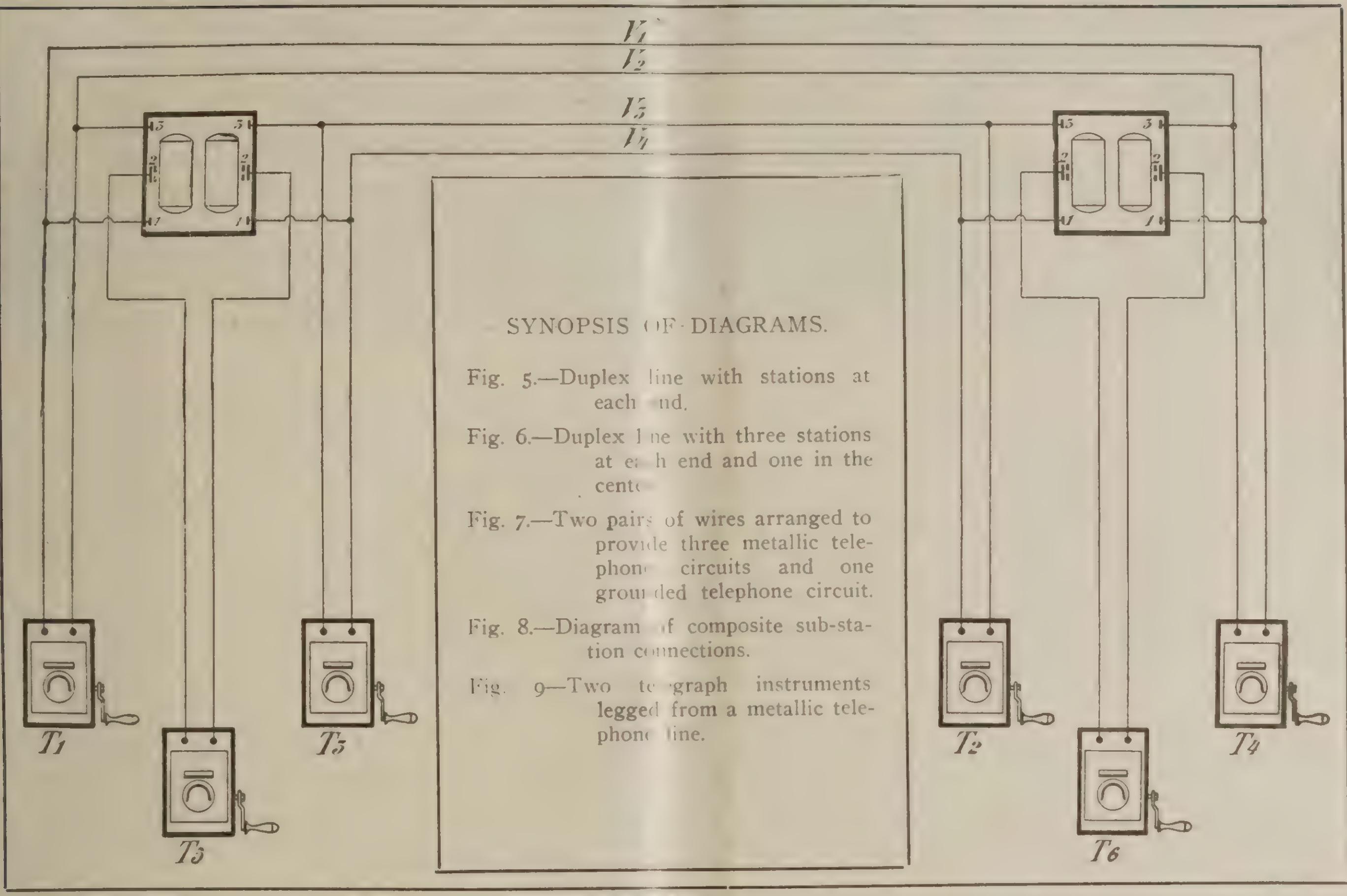


FIG. 8.

COMPOSITE CIRCUIT DIAGRAMS



SYNOPSIS OF DIAGRAMS.

Fig. 5.—Duplex line with stations at each end.

Fig. 6.—Duplex line with three stations at each end and one in the center.

Fig. 7.—Two pairs of wires arranged to provide three metallic telephone circuits and one grounded telephone circuit.

Fig. 8.—Diagram of composite sub-station connections.

Fig. 9—Two telegraph instruments legged from a metallic telephone line.

FIG. 5.

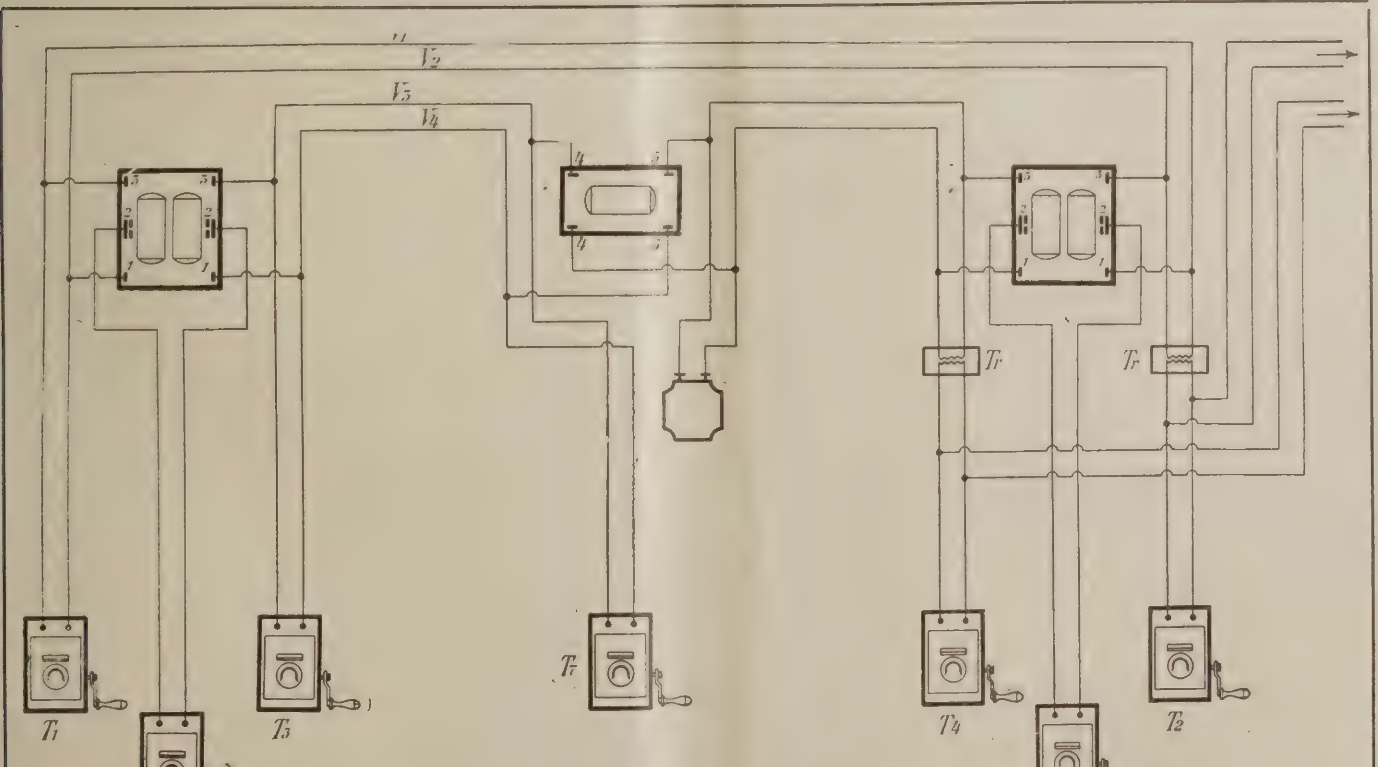
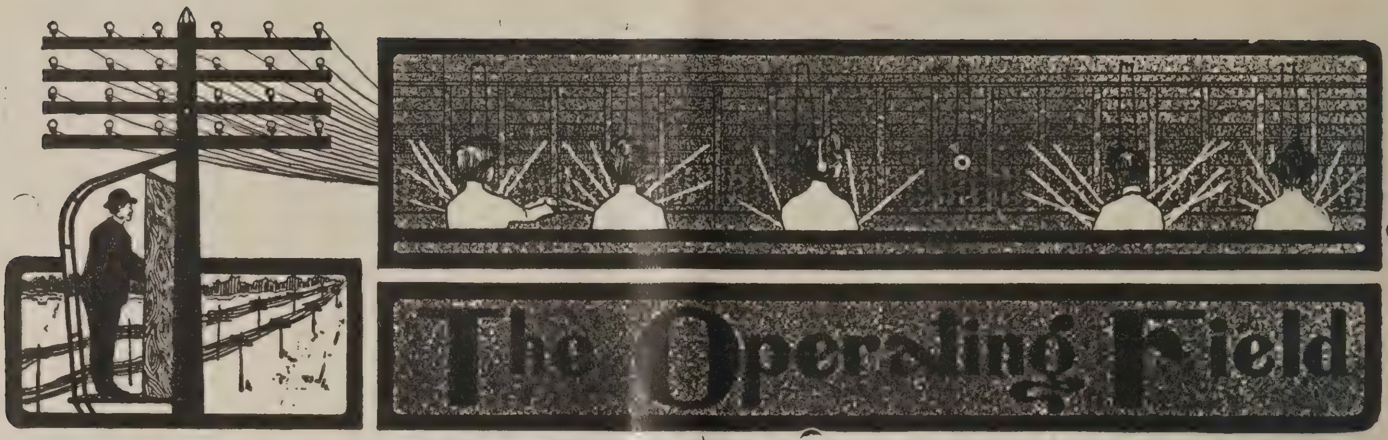


FIG. 6.



ODD METHOD OF COMPETING.

By H. A. Lane, *Special Correspondent.*

THE Pittsburgh & Allegheny Telephone Company is deriving no little benefit from the circular letter recently issued by C. H. West, a member of Pittsburgh's Select Council, asking that every subscriber of the Pittsburgh & Allegheny Company's service, register their kicks with him, and incidentally soliciting all the complaints possible through newspaper notoriety. The circular bears all the ear-marks of the time-worn methods of the Bell Telephone Company, and as the councilman referred to is an employe of a prominent director of the Bell Company the public is not slow in jumping to a conclusion that favors the Pittsburgh & Allegheny. The circular issued was for the purpose of investigating complaints that the Pittsburgh & Allegheny Company is violating its ordinance by charging higher rates for its service than the rates prescribed in its Pittsburgh franchise. The circular asks the subscribers of the Pittsburgh & Allegheny Company if they are paying more than $48 and $36 a year for service, these being the rates specified in its ordinance for business and residence telephones.

The Council Committee appointed to investigate the trumped up charges before the circular was issued found so little matter to act upon that it was deemed necessary to send out for more and louder kicks. Instead of a flood of matter from the Pittsburgh & Allegheny subscribers derogatory to that company, the Council Committee has received dozens of letters stating that the Pittsburgh & Allegheny service is far above the Bell service, and that the members of council ought to be condemned for taking such underhanded methods of persecution. It has been found that the rates charged by the Pittsburgh & Allegheny were not only according to its franchise, but were eminently satisfactory to the subscribers, so much so that many of them wrote to the councilmen that if the rates were twice as much they would gladly pay them rather than be forced to use Bell service.

Sidney H. Browne, vice-president and general manager of the Pittsburgh & Allegheny Company, has not only welcomed the circular letter as a boomerang, which was certain to react against the Bell authorities, as it already has, but has urged his subscribers to write to the committee and state frankly what they think of the Pittsburgh & Allegheny and its service.

Mr. Browne said: "I view this circular as an unwarranted attempt to make trouble for the Pittsburgh & Allegheny Telephone Company. Everything the Pittsburgh & Allegheny has done is clearly within its legal rights. How, therefore, Chairman West can think it necessary to erect the bugaboo he has is beyond my ken. Some people think that the issuance of these circulars will annoy the Pittsburgh & Allegheny Company, but the facts are that while we probably would not have suggested the movement, yet it has been an excellent advertisement."

INDIANA INDEPENDENTS ARE WINNING.

By R. D. Fisher, *Special Correspondent.*

THE Central Union Telephone Company is gradually losing ground in Indiana. The company, which has had a franchise in Wabash for twenty-five years, has abandoned this field, so it is announced on semi-official authority. The business of the Central Union had dwindled until the patrons were so few that the exchange operated at a considerable loss for the past four years, while the Home Telephone Company gradually secured all the valuable connections.

The franchise of the Central Union expired several weeks ago, and, though the general office was notified, no steps to secure a renewal have been made. When the Independent service was established five years ago the Central Union sought to stifle the venture by giving service substantially free, but in spite of this unbusiness-like competition the Independent company thrived, and a little over a year ago the Central Union returned to the old rates, which are 50 per cent. higher than its competitor's, with the result that it got no new business and lost heavily of the old. It is understood that the company will maintain a toll station in Wabash.

It is thought that this is only a beginning of the plan of the Bell Company to abandon unprofitable fields in Indiana. The Independent companies are giving so much better service and are apparently more aggressive that patrons in many parts of the State are ordering the Bell instruments taken out. Another effort of the Bell Company has proven a failure—that of pandering to the farmer. During the six months of the present year nearly a hundred telephone companies have been organized and incorporated. Two-thirds of these are to afford service to the farmer. The tendency to merge these lines after once established and the securing of city and county seat connections precludes any hope of the Bell Company getting any considerable amount of farm business.

NEW FEDERAL STOCK ISSUE.

THE directors of the Federal Telephone Company have authorized the issue of $500,000 of 6 per cent. cumulative preferred stock of the par value of $100 a share. This stock will be sold at 80, says *Finance,* and the proceeds used to extend the plant of the company and pay its floating debt.

The Federal Telephone Company will acquire $125,000 par value of this stock in liquidation of the United States debt to the Federal. The United States Company is now earning about $60,000 a year, or 12 per cent. on the entire issue of preferred stock. It is figured that with the additions which will be possible with the new money that the company will not only earn its preferred stock dividend, but that it will earn from 5 to 6 per cent. on the $2,000,000 of common stock, which is all owned by the Federal Telephone Company. The extensions will be made at an early date. It is probable that the Everett-Moore syndicate will take most of the stock that is sold for cash.

There are now about $400,000 of Federal pool receipts outstanding calling for United States telephone and Cuyahoga telephone bonds. There were originally about $600,000 of these pool receipts outstanding, but about $200,000 have been taken up on the proposition submitted some time ago by which the pool receipt holders were given bonds for pool receipts on condition that they subscribe for an equal amount of United States telephone bonds at 85. Of these $400,000 of pool receipts outstanding fully two-thirds are Cuyahoga receipts. As a result of the issuing of preferred stock by the Cuyahoga and United States companies the Federal has in the neighborhood of $600,000 or $700,000 of the preferred stock of the Cuyahoga, and about $125,000 of the United States preferred stock. A proposition has been made to the pool receipt holders by which fourteen shares of the United States preferred stock will be given in exchange for each $1,000 United States pool receipt and 16 shares of Cuyahoga preferred will be given in exchange for each $1,000 Cuyahoga pool receipt. These pool receipts are selling on the market at $500 for each $1,000 receipt. Therefore, a person buying them at $500 will be able to get a par value of $1,400 in United States stock or $1,600 in Cuyahoga stock. Both of these stocks are 6 per cent. cumulative preferred and the proposition looks like a very fair settlement for the pool receipt holders.

SPRING ALSO AFFECTS LINEMEN.

OFTEN we have read of the remarkable quality that Spring is said to possess of turning a young man's thoughts toward love and poetry. We have come to believe that this affliction occasionally affects telephone linemen, and as an evidence submit the following, which the author who is in the employ of the Gainsboro Telephone Company of Sparta, Tennessee, calls:

OUR TELEPHONE GANG.

Just follow us up, if you like plenty of noise,
We rolicsome, frolicsome telephone boys;
We're jumpers, we're bumpers, we're climbers to boot,
We're just anything that it happens to suit.
We're diggers, we're punchers, we're pounders all night,
And feel entirely at home in a rough-tumble fight.
We can sing, we can dance, we can jump or can run,
We can handle the steel, the shovel or gun.
If there are any who doubt it, come, see us try,
We will make you believe us in the wink of an eye.

We love the young and the old, especially old maids,
We would have all understand we are "Jack of all trades."
Don't be so discourteous as to call us bad names,
For the wildest Hill Billy we surely can tame.
So don't come with the intention of painting our camps red,
For you will leave with the appearance of one returned from the dead.
So if you come among us with this object in view,
We'll give some advice of possible interest to you,
That is, "To never leave anything to chance,
But to have your breastplate in the bosom of your pants."
For it is more than likely when you take to your heels
You might a part of the top of our medicine chest feel.

Don't believe it a bit if you hear we are tough,
Among the telephone boys there is many "diamond in the rough."
We're a set of brave lads with hearts true as steel,
We rejoice with the many, for the sad ones we feel.
Whether out in the sun, on top of a pole,
Or down on the ground simply digging a hole,
We are just the same boys, light-hearted and gay,
With never a trouble coming our way.

But day after day we go on with our work,
And woe to the man who some duty will shirk.
He is stranded across some object that slants,
And administered a dose, on the seat of his pants.
So if he needs it he gets it, and we're pretty sure
That one dose will all shirking cure.
'Tis enough sometimes to make you turn pale,
But our foreman doesn't know the little word "Fail."

Now if you would like to be a telephone man
Sign the obligation and you are one of the band,
Prepared to give and to take exactly what you need,
For such is the life we "Telephoners" lead.
But, hark! What was that? 'Twas the telephone rang,
And this is enough of the "Telephone Gang."

We understand that the poetry was written on the night after pay day, before any of the bad effects had yet been felt. It would be interesting to read a composition from the same author written on the morning after.

A NEW ILLINOIS PLANT.

THE Independent Construction Company, of Archbold, O., has opened an office in Kankakee, Ill., where it is constructing a telephone plant for the Eastern Illinois Independent Telephone Company, which, when completed, will be one of the model plants of the State. A building is being constructed at a cost of $25,000, the city contemplating leasing half of the lower floor for city offices and police headquarters. A sixteen hundred line board is being installed with a trunking capacity of twenty-four hundred lines and about two miles of underground conduit are being constructed.

The construction company built the Fayette, Antwerp, Versailles, Covington, Achbold, Pleasant Hill, Ohio, and the Harrison County Companies system, comprising Cadiz, Jewett and Scio, Ohio, plants and toll lines, also the Union City, Ind., system.

It is composed of the following bankers of Northwestern Ohio: L. D. Gotshall, I. W. Gotshall, George H. Probeck, C. M. McLaughlin and A. J. Vernier, being stockholders and officers of banks at Toledo, Defiance, Delta and Archbold, Ohio, and also heavy stockholders in a number of Independent telephone systems in Ohio, Indiana, Michigan and Illinois.

The officers of the Independent Construction Company are: President, C. M. McLaughlin; vice-president, L. D. Gotshall; manager, A. J. Vernier; secretary, George H. Probeck; treasurer, I. W. Gotshall. Directors, C. M. McLaughlin, L. D. Gotshall, A. J. Vernier, George H. Probeck, and I. W. Gotshall.

ONE ON THE MANAGER.

A RATHER good story is going the rounds among telephone men. We have it that the incident actually happened, but of course can not commit ourselves. When the story came to us it was in about the following shape:

A manager of a reasonably large telephone exchange, who prided himself on his dignity and the discipline he maintained among his operators, was in a lunch room with a party of friends. One of them stepped up to the telephone and called the central office. "Your manager is over here," he said so loudly that it could be heard all over the place, "and he is in a badly intoxicated condition. Is there some one there in the office that can come over here and assist him to his room?" After waiting a while to hear apparently what the operator in the central office was saying in reply to this startling statement, he hung up the receiver and turned around to witness the effect.

For the next few minutes there was "something doing" in the restaurant and one man was doing most of it. The manager said that he would be obliged to remove that telephone and demanded of the talkative friend that he call up the central office and explain to the young ladies that his previous statement was a false one.

Finally, after an energetic exchange of words, it was explained to the manager that the telephone had not yet been connected up. Lately the friends of the manager have noticed a careworn expression on his face and have wondered the cause.

Moral: "Managers, know your exchanges."

WEST PENN COMPANY WILL BE REORGANIZED.

WITHIN the course of a few months it is hoped to have the old West Penn Telephone Company, now in the hands of a receiver, completely reorganized and the lines materially extended under an increased capitalization, says *Money*. A meeting of the creditors and others interested was held recently in Washington, Pa. Long-standing accounts against the old company were vigorously objected to, and may not be allowed by the auditor. These accounts will aggregate about $24,000. A further hearing will be held some time in the near future, when the reorganization plans will be taken up and put into shape. The company will be reorganized under the title of the Chartiers Telephone Company. Its capitalization is now $30,000, but this will be increased after the plans for extension have been agreed to. It is hoped to take the company's lines into entirely new territory. The towns now traversed by the system include Washington, Carnegie, Oakdale, McDonald, Cross Creek, Midway, Burgettstown, Patterson's Mills, West Middletown, Independence, Buffalo, Bethany, Taylorstown and Claystown.

TOOK AN EXAMINATION OVER THE TELEPHONE.

WHILE floodbound in St. Louis, Mo., Percival E. Fansler, chief clerk of the department of electricity of the World's Fair, took an oral examination over the long distance telephone. Mr. Fansler has been a student in the electrical engineering course at Purdue University. When the time came for the examinations to be taken, he found he would be unable to get to Purdue, which is in Indiana. He then made arrangements to take an oral examination over the telephone. Accordingly certain instructors at Purdue stationed themselves at one end of the line and Mr. Fansler took his position at the other end. The professors would submit a question and the candidate would answer it. The examination was passed, and Mr. Fansler will receive his degree.

MUNICIPAL ELECTRICIAN'S CONVENTION.

THE international Association of Municipal Electricians will hold their annual convention at the Hotel Rudolph, Atlantic City, N. J., Sept. 2, 3 and 4. It is expected that among other features there will be a demonstration of the Cooper Hewett mercury vapor lamp and converter. Also the De Forest Wireless Telegraph Company have promised a demonstration of their system.

The Editor's Page.

SOME FACTS FOR BELL STOCKHOLDERS.

THERE is some very interesting matter in the statement issued recently by the Independent Telephone Company operating at Ithaca, New York, matter that ought to be profitable alike to Bell and Independent stockholders. To Bell stockholders this statement is of interest because it shows in a striking way how their money is being used, or rather misused, in the effort to drive competition out of the field by methods that are costly because they are underhanded and futile because they are not honestly directed. To Independent stockholders the statement is of interest because it makes clear the fact that they have the opposition well in hand, and that it is only a question of holding on even in those isolated cases where investments do not pay almost from the start. The statement is a lengthy one, and we have quoted from it before, but the section we have in mind now bears particularly on the financial side of the fight. It was put out in answer to paid reading notices issued by the New York and Pennsylvania Telephone Company, the Bell licensee in Ithaca, and rehearsed the usual array of alleged "failures" in the telephone field, these "failures" being the regular list of companies involved years ago through the operations of the Everett-Moore syndicate. Commenting on this the Ithaca Telephone Company says, among other things:

"The New York and Pennsylvania Company neglected to mention the most important telephone failure that has occurred, namely, the Michigan Telephone Company. This Bell Company was forced, through its inability to compete with Independent companies, to default on its bond interest last July, and again in January; and in February of this year the Union Trust Company, of Detroit, was appointed receiver for the Michigan Bell Company. This Bell failure involved a greater investment than the grand total of all the Independent companies included in the Bell list of Independent failures, to which reference has before been made.

"Under the present circumstances is it improper to state that many Bell companies, perhaps a majority, have not paid dividends for several years? This is true of the Bell Company operating in Ithaca. This being the case, what would be the result if there was no competition? Would the New York and Pennsylvania Company continue to maintain good service at its present rates and without dividends or would rates probably advance? Is it ever safe to depend on an over-capitalized and royalty burdened corporation to furnish a commodity at reasonable rates when the same can be secured permanently under conditions profitable to the party so furnishing and satisfactory to the public?

"The Ithaca Telephone Company is entirely out of debt, other than its outstanding bonds, which are less than one-third as much per telephone as is the bonded debt of the New York and Pennsylvania Company per telephone. We are earning more than our bond interest and can maintain our service and rates in Ithaca as long as we continue to receive the patronage of Ithaca citizens.

"The Independent companies have largely outstripped the Bell companies in a number of States. Thus, in Ohio there are over 50,000 more Independent than Bell telephones, while in Indiana the excess of Independent telephones is over 70,000. The Far West is also rapidly being developed. In Kansas there are over 40,000 Independent telephones in operation and less than 12,000 Bell. The long-distance lines connect the St. Louis, Mo., exchange with Illinois, Indiana and Ohio Independent system, and before the year is completed the probabilities are that the long-distance lines from Ithaca will be connected with the systems in other States, and we can then furnish to our Ithaca patrons long-distance facilities for talking with more telephone users in the States named than can be reached by any other system."

A PLEA FOR PROMPT ANSWERS.

IN their efforts to secure a quicker and more efficient service there is one request that the telephone companies are making of their subscribers, that is, a prompt answer to the bell. In the old times of inefficient service there was a certain natural reluctance to go to the telephone. You never knew what you were going to get. You might get your caller instantly and clearly, or you might get a confusion of voices and noises, or you might get nothing at all—a mute, dumb wire which gave you not even the satisfaction of a wrangle or the opportunity of letting off any explosive language. With this uncertainty before you you naturally did not respond very eagerly to the insistent call of the telephone bell. If it was not convenient to go to the telephone directly when the bell began to ring, you consoled yourself with the reflection that probably it was a wrong number, or that you were going to have a struggle of some sort, anyhow, with no result profitable to yourself. And quite often you were right. To-day matters are different. When the telephone bell rings you have a confident feeling that some one is making a personal call on you, and is there on the wire ready to speak to you. Consequently there should be no unnecessary delay ,and undoubtedly there is less than there was in former years.

But there is still more delay than there ought to be. The called subscriber's answer to the bell is still responsible for the greater proportion of the time taken to operate a local connection. There has been an improvement, no doubt, due to the higher standard of service, the large use of desk telephones, and the greater and more general familiarity of the public with the requirements of the telephone service. Nevertheless, the average time taken by the subscriber to answer the telephone bell is still much greater than it should be, and it still lies in the power of the subscriber greatly to increase the efficiency of the telephone service by cutting this time down. It represents at present the larger proportion of the total time occupied in getting two subscribers together on the telephone, and as long as that is so it will remain a standing reproach to telephone subscribers in general. In order to give a phenomenally perfect telephone service all we now ask of the telephone user is that he shall speak his orders clearly and accurately and answer the bell as quickly as he can—much quicker than he does. In asking that little we have much reduced the demand formerly made on the telephone subscriber for his coöperation, and have removed all cause for grumbling on the score of the service being difficult to use. Having made things so simple and easy for the subscriber it should be a point of honor with him to aid us in perfecting the service by giving the uniformly quick answer we ask.

AN ECHO OF A FAMOUS FIGHT.

WE read that the committee that was formed last November to organize a protest against the transfer of the Tunbridge Wells (England) municipal telephone system to the National Telephone Company has just been disbanded. A further note on the subject throws a little more light on British municipal telephone methods and gives some indication of the reasons for the hopeless failure of municipal telephony in England. It is proposed to organize a "Telephone Users' Protection Association," and the reason why a body with such a pretty name is wanted is this: While the municipality worked the telephones no contract beyond a written request to be connected with the system was required. The subscribers now refuse to sign contracts, or at least some of them do, and they want a Society for the Prevention of Cruelty to Telephone Subscribers to protect them. The fact that the municipality neglected to put its telephone business on contracts shows the laxness of municipal business methods. As we have ventured to suggest before, the British public will never get any sound development of telephony by means of municipal competition.

Switchboard.
Testing Voltmeter at Left End.

Wall Telephone.
Showing Compact Construction.

Combination
Chief Operator's and Wire Chief's Desk.

New York Elevated Railway Company's Telephone System

By Howbart H. Botsford.

Up-to-date street railway systems the world over are now considered incomplete without their telephone exchanges. The largest exchange equipment of this nature ever installed was recently turned over to the Manhattan Elevated Railway Company by the contractors, The Lambert Schmidt Telephone Manufacturing Company, of New York City.

With the installation of its new third-rail electric system the railway company found it necessary to have some means of communication between the main and sub-power stations and between the different offices and properties of the company. A telegraph system has long been in use, but it could not perform the functions expected of the telephone. Accordingly a contract was let, with the result that a telephone plant thoroughly up to date and equipped with all the modern time-saving appliances, is being operated by the company. The installation is the counterpart of one which would be installed in a small town, except that probably more money was spent in details and refinements than the average small town telephone company would care to invest.

Sub-station telephones are placed in all the offices, yards, terminals, power and sub-stations, which are operated by the company. There is one telephone at every elevated railway station. Both desk and wall sets are used. The type of wall set is shown in the central photograph. The wall telephones are smaller and more compact than those ordinarily used. The transmitter, instead of being supported by the customary solid arm, is held in position by two neat metal rods, which give it an open, finished appearance.

The equipment is full central energy throughout and is used exclusively for the business of the Manhattan Railway Company. There are no outside connections with any of the New York Telephone Company's exchanges. With the present normal conditions about 1,400 calls per day are being handled. It is expected that this number will increase when the railway becomes more addicted to the telephone habit.

The exchange is located on the second floor of one of the buildings owned by the company, which is located at Ninety-ninth street and Third avenue. The switchboard is of the common battery, double supervisory, multiple type and is equipped with six operators' positions. An ultimate capacity of 600 lines has been provided for. About half of this number are in use at the present time. There are 15 plugs at each operator's position. The usual equipment of supervisory signals and combination ringing and listening keys are provided. A key is provided at each position which throws all the head sets together. A key on each position is arranged to open the operator's transmitter circuit so that the line can be listened in on without the persons talking being aware of it. This device was found necessary to check unbusiness-like conversation. Piano finished mahogany was used in the construction of the switchboard. The switchboard is shown in the photograph at the top of the page.

A feature of this switchboard is the manner in which the multiple jacks are arranged. Instead of their being placed in the usual position above the answering jacks they are placed in separate panels on either side of them. This enables the total height of the switchboard to be decreased.

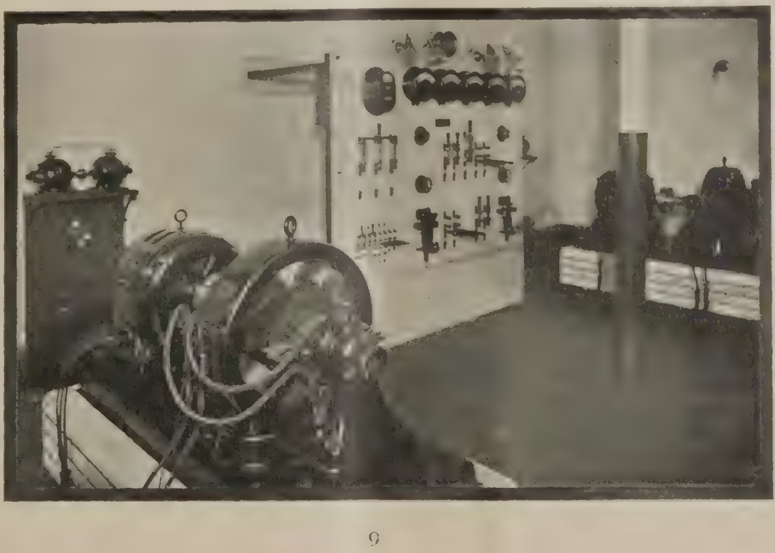
Set in the left end panel of the switchboard is a voltmeter with which rough line tests for the location of faults can be made. No intermediate rack is used. The outside cables come in at the back of the building and are connected to the arrester side of the distributing frame, which is located behind the switchboard. Jumpers are run and connected with the lugs, to which the switchboard leads are soldered.

A combination wire chief's and monitor's desk, which is shown in the photograph at the top of the page, is a part of the equipment. This desk is provided with the regulation testing voltmeter and the usual complement of testing plugs and keys. Lamp signals are arranged so that the operators can be supervised from the same desk.

The power plant is thoroughly up to date in every respect. Energy is received in the form of a three-phase 390-volt alternating current which is converted into direct for charging the storage batteries. The ringing current motor generator is run from the storage batteries. The switchboard which is shown in the figure is of white Italian marble, and is fully equipped. The storage battery contains 44 25 ampere hour cells. Cables underground and overhead are used for distribution. The switchboard equipment and power plant were installed under the direction of W. T. Booth and J. C. Albers, of Lambert Schmidt Co.

Mr. W. H. Kinlock, who has charge of the telephone department of the Manhattan Railway Company, has charge of the system.

Power Plant and Switchboard.



CUTTING MAGNETO TO COMMON BATTERY.

(*Continued from page* 3.)

have room to write, is wired to the outside contacts of a key *A*, to the inner contacts of which is connected the testing voltmeter. The middle, or normal contacts are wired through a 24 volt battery *D*, consisting of Fuller cells, to a reversing key *B*. The line is connected to the normals of this key. The line to be tested being taken up on the main distributing board, and the key *A* adjusted as shown, the voltmeter with the battery in series is cut in on the line.

When the receiver is on the hook at the subscriber station, if the condenser has been properly placed, no current will flow through the voltmeter. When the receiver is removed from the hook, the line will be closed, current will flow and the voltmeter will indicate the full potential of the battery. By means of the key *A* the voltmeter can be cut out, the telephone cut in, and communication established with the subscriber station. It should be observed that the battery *D* is on the line continually. The reason for keeping it on the line during conversation is that the receiver at the subscriber station may be "poled." A glance at Fig. 1 will show that when the receiver is off the hook, the current from *D*, Fig. 3, will flow through its coils. When the current is thus caused to flow through the receiver coils, it will render the receiver more or less sensitive, according as the field set up assists or opposes the permanent field of the receiver, and the receiver cord has to be so connected as to make the direction of current flow, such as to assist this permanent field.

The method of the procedure is for the man testing to inquire of the instrument setter: "How do you hear me?" then reverse the key *B* and repeat the question.. The testing circuit is so wired that, in its normal condition, the direction of current flow on the line is the same as that which will obtain with the new system. So that if the instrument setter reports that he hears better when *B* is reversed, he is instructed to reverse the position of the tips of the receiver cord.

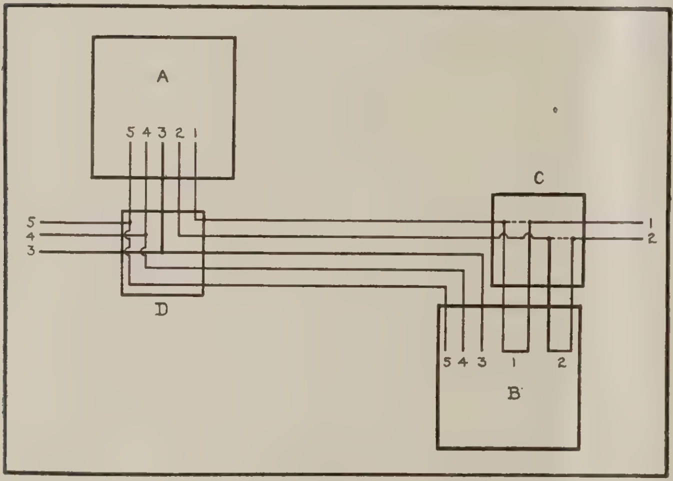


FIG. 4.

With this apparatus a test is also obtained of the insulation resistance between the two sides of the line.

Contemporaneously with the testing and condenser wiring above described, there is being installed either in the office already in use, or a new one, a new switchboard designed to operate on the common battery system, with complete wiring to a new distributing rack. The working lines are bridged and brought to the opposite side of this new rack. There are two ways of doing this work, which are shown in Fig. 4, when *A* represents the old and *B* the new exchanges. At *C* is a manhole in front of the new exchange, and at *D* is a manhole in front of the old.

The cables 1 and 2, which pass by the new exchange, are cut in the manhole *C* and each end spliced to a cable which runs to the main distributing board in the new exchange. By cross connecting the conductors in these two cables on the main rack, the wires are made continuous to the old exchange. The cables 3, 4, 5, which do not pass the new exchange, are bridged in manhole *D*, and the bridging cables brought to the main distributing board of the new exchange, so that while the lines in these cables continue to work as before, they appear in the new exchange.

The battery used in the new system has one terminal grounded, as will be seen by reference to Fig. 2. This is done for the purpose of operating certain automatic signals used on the trunks. The current for this purpose flows from one office over the line to the other office, and returns through the ground. In cities where the trolley system is used, readings must be taken of the difference of earth potential between the exchange in question and all other exchanges to which trunks equipped with automatic signals are to be run, and the battery so poled that it will be assisted by this potential difference. Since the difference of earth potential fluctuates from day to day, and from hour to hour of the same day, the readings must be taken to determine these fluctuations. Good practice is to take readings every 15 minutes from Friday morning till Monday morning. The test should include the day on which the car traffic is apt to be the heaviest.

The work of cable splicing having been finished; the condensers set at all stations, and all the lines tested out; the insulation of the lines having been brought up to the best condition; the new switchboard with its wiring, and new distributing board having been installed, we are now ready to transfer the service from the old switchboard to the new. The time selected for this work is usually Saturday night, because the business is the lightest at this time, and the day following, being a light day, affords a good opportunity of enabling the operators to adjust themselves to the new conditions, and also affords an opportunity for clearing whatever trouble may have occurred during the "cut-over."

The trunks are transferred first, and as each group is cut over to the new system they are tested out. The subscriber lines are taken next and cut over in blocks of 100 lines. The method of cutting over consists of opening the line toward the switchboard at the old main distributing board, and closing it toward the switchboard at the new. This work is performed very easily, since each line passes through two sneak current arresters placed on the main rack, which are readily placed or removed. When the time for the cut over comes, these sneak current arresters are removed from the lines on the old rack, and placed on the new. The actual time taken up by this part of the work is about half an hour.

The last step to be performed is to replace the old magneto telephones with the new ones of the common battery type, and a gang of instrumnt setters is started on this work the first thing on Monday morning and pursued until it is completed. At the same time the work of removing the old cables is carried on, and the taps going to the old office are cut-off, in the manholes. Where the cabling has been done as shown at manhole *C*, Fig. 4, all that is necessary is to cut the cross connections on the main rack. Where the work is done as shown in manhole *D*, the old cable taps have to be cut off in the manhole, a piece of work which requires the utmost care to prevent the short-circuiting of the lines.

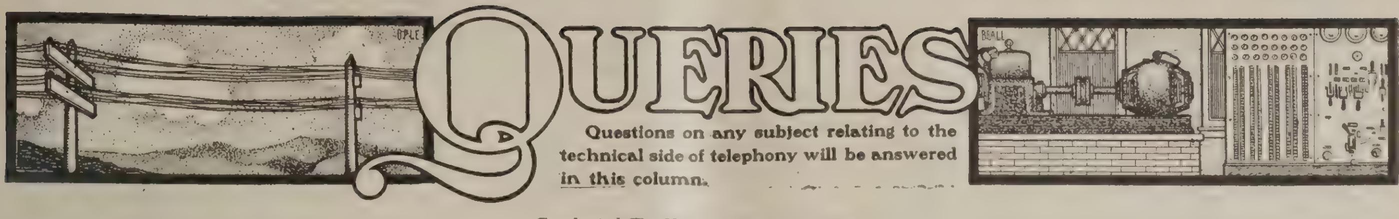
THE NEW ENGLAND BELL BECOMES ORIGINAL.

A METHOD of increasing the earning capacity of an exchange which appears to be somewhat novel has recently been originated and put into practice by the Bell Telephone Company in New England. The figures show that the method results in an increased earning of $70 per year per telephone. The "Rockland, Maine, Star" tells the story as follows:

"A wagon load of telephones brought in from Warren yesterday represents a snug profit to the telephone company, according to the calculation of Mr. Story. It will be remembered that he told the Camden committee that it cost the company $88 a year to maintain a telephone. As the rental is only $18 a year there is evidently a profit of $70 to the company on each telephone taken out. The thirty telephones brought in by the wagon last night would at that rate represent a saving of $2,100 a year.

CONFLICTING TROLLEY AND TELEPHONE WIRES.

TOWNSEND, REED & COMPANY, who operate a trolley line in Boone county, Indiana, have been temporarily enjoined from letting their trolley wires interfere with the telephone company's wires where the two intersect in Eagle township. The complainant alleges that on May 31 the defendants, or their employees, pulled their trolley wires under and up against the telephone wires, thereby short-circuiting the telephone wires and rendering them wholly inoperative. The telephone company removed the trolley wires, but the electric railway employees replaced them, again short-circuiting the telephone wires. A hearing will be had before the injunction is made permanent.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

Conducted By WILLIAM W. DEAN

SELECTIVE SIGNALING SYSTEMS.

Can you give me some information regarding the ringing systems, of which find enclosed diagrams.

A.—Referring to Fig. 1, would like to know whether alternating or direct-current generators are generally used to signal the central office, and if it is intended that both subscribers' bells should ring when one of them is trying to call the central office. The diagram should represent ringing, either on tip or sleeve, according to party wanted.

B.—Referring to Fig. 2, which is the four-party system commonly used, what kind of a generator is used, and as both sides of the line are grounded, would not some of the bells respond when signaling the office.

R. H.

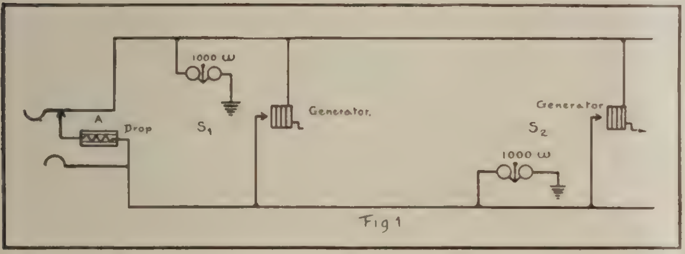


Fig 1

A. Either alternating or pulsating current generators can be used to signal the central office. If an alternating current generator is used the resistance of the drop at *A* is made so low that a greater part of the current generated will pass through it and not enough will pass through the bells at the subscribers' stations to ring them.

We have never heard of a direct current generator being used in a telephone set. The generators which are commonly used for this purpose produce a pulsating current, i. e., one whose direction is always the same, but instead of the current being steady it is intermittent. A pulsating current generator will not ring an alternating current bell, therefore generators of this type could be used in the circuit shown in Fig. 1. The subscribers' bells are not intended to ring when central is signaled.

B. In Fig. 2 the conditions are about the same as in Fig. 1. Either a pulsating or an alternating current generator can be used at the sub-station, but the resistance of the drop at A^1 is made so low as compared with the resistance of the two ringer coils, which are really in series across the line, that a greater portion of the current generated will pass through the drop and not enough will go through the bells at the sub-stations to ring them.

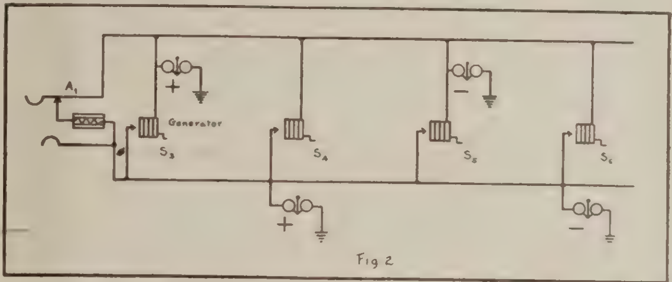


Fig 2

TEST POSITION FOR TELEPHONE WIRES.

Will you please answer the following through the JOURNAL: If telephone wires are strung parallel to and under covered electric light wires, how far from same should they be placed for good service? Would it be any better for service or for safety to have the telephone wires above instead of under the light wires?

The telephone wires should be placed as far away as possible, although a great many lines are operated only one cross arm distant from the power and light circuits. It is better to place telephone circuits under power wires so that if they break they will not become crossed, and also so that the linemen will not have to crawl among high-tension wires to reach the telephone circuits.

Foreign Currents

By the Arrester.

The Telegraph Conference

THE International Telegraph Conference is now meeting in London, and is the cause of gathering together in the world's metropolis representatives of the telegraph administrations of the civilized countries of the globe. The United States is represented by General Greely, the distinguished chief of the Signal Service Corps of the United States Army. The conference meets about every five years, and its deliberations last some five or six weeks. It does not deal with technical questions at all, but chiefly occupies itself in the compilation of vexatious and complicated regulations affecting the international telegraph business of the world. It also deals to some extent with rates. The proceedings of the conference are private and are conducted in French, which must be a serious handicap to those not born to that graceful and elegant language, while it must give to those that are a distinct advantage in putting through any measures they happen to be particularly interested in. A peculiar feature of the Conference is that although delegates from the various submarine cable companies are allowed to attend, to discuss and to suggesct, they are not allowed to vote, that privilege being reserved to the official delegates. The cable company men represent interests of considerably greater importance from all points of view than those represented by the officials of the land line systems, but such is the irony of officialdom that the business men may only propose while the officials dispose. Telephony has hardly been touched on hitherto, but as international telephony is beginning to assume importance there will probably be some discussion on the subject at the present Conference.

Mr. Chamberlain Reflects

M. AUSTEN CHAMBERLAIN, the British Postmaster General, made some interesting references to the telephone situation during a debate on the Post Office vote in the House of Commons. Asked why the average cost of a telegram in the British service was 24 cents, whereas the average revenue was only 15 cents, he said that public opinion demanded at the same time greater telegraph facilities, cheaper telegraph rates and higher pay for the telegraph staff, and that he could not satisfy everybody and make both ends meet. He hoped the telephones, meaning the Post Office teelphones, would pay a profit. Meanwhile the Post Office got $750,000 a year in royalties from the National Telephone Company, which helped to pay the loss on the telegraphs. Then he ungenerously, and unpractically, added that he thought it a misfortune that telephone licenses had been issued, and he could not believe that any Postmaster General would renew the present license when it expired in 1911. Mr. Chamberlain is a bit contradictory here. He admits being unable to run the telegraphs on commercial lines, and in the next breath bewails not having the telephone service in the same boat.

The Telephone in the Courts

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law.
They will be answered and explained by Mr. McMillan on this page.

"UNDERBUILDING" HELD TO BE UNLAWFUL INTERFERENCE.

THE Supreme Court of Minnesota has affirmed the decree of the lower court in the case of the Northwestern Telephone Exchange Company v. the Twin City Telephone Company, and has decided that the Northwestern Company is entitled to an injunction restraining the Twin City Company from stringing its wires under those of the Northwestern Company in the city of Minneapolis. In 1878 the Northwestern Company, under a franchise granted by the city, placed its poles and wires in the streets and alleys, and since then has maintained and extended its system to meet the necessary requirements of its business. In 1898, by authority of a charter of the city, the defendant crossed the lines of the plaintiff, the Northwestern Company, upon poles at street intersections, and erected its wires immediately thereunder. Its manner of doing this, the court held, was such as to interfere with the Northwestern Company in the necessary use of its franchise and to hinder repairs and additions necessary to meet the requirements of the public service. In its opinion, written by Justice Lovely, the court laid down the following principles:

First—In the absence of positive regulation by statute or ordinance controlling the construction of telephone lines in a municipality, the party first lawfully installing the same acquires superior rights in the erection of poles and wires in streets which forbid a subsequent occupant for the same purpose to interfere therewith.

Second—The prior lawful occupancy of urban streets by a telephone company will not necessarily create a monopoly of all the aerial space which it appropriates, but may give such occupant such substantial rights in the conduct of its business as may be required in the growth and extension of the same to meet the immediate demands of the public service, subject to the control of the courts to restrain another telephone company from unnecessary interference therewith.

The court therefore held that the erection and maintenance of its poles and wires by the Twin City Company was an illegal impairment of the plaintiff's rights, which might be restrained by injunction.

The case is similar to that of the Chicago Telephone Company v. the Northwestern Telephone Company, 65 N. W. R. 329, in which the Supreme Court of Illinois decided that prior authority to occupy or prior occupation of the streets of a city by a telephone company did not confer upon it an exclusive right. The Minnesota court holds that while exclusive rights cannot be acquired, superior ones may be acquired by the first occupant, thus measurably extending the doctrine of the former decision. The result in the Illinois case was the opposite from the result in the case we are discussing, for the petition for injunction was dismissed by the Illinois court. The interference there charged was not "underbuilding," but "overbuilding," which the court approved as a proper method of construction.

TAXES FOR 1898 AGAINST IOWA TELEPHONE COMPANIES INVALID.

A TAX case of much importance to many Iowa telephone and insurance companies was recently decided by Judge McHenry, of Des Moines. The State tax ferrets, who are inquisitors in tax matters, brought suit, through John McKay, Sr., treasurer of Polk county, against the Iowa Telephone Company to collect $610 taxes for the year 1898 on an assessed valuation of the company's property of $40,000. The company refused to pay the taxes, asserting that only the executive council of the State had the right to assess the taxes and decree how much they should be, and that on payment of taxes to the State the company was exempt from paying them to the county.

Under a former Iowa statute, telephone companies, together with other carriers and transmitters, were assessed arbitrarily by the State Executive Council and paid taxes exclusively to the State Treasurer. A new measure, called the Cheshire bill, was passed by the State Legislature providing for the payment of taxes in various counties, with an executive council assessment of the valuation of the line in the entire State. Judge McHenry held that Section 1374 of the Iowa Code did not give the county treasurer the right to step in and apportion the taxes assessed by the executive council to the various counties and decree how much shall be paid in each county through which the company's line passes, and that any such action on the part of the county treasurer was illegal and void. It was this action of the county treasurer which apportioned $610 as the 1898 taxes for the Iowa Telephone Company, and under his ruling this need not be paid. The complaint of the treasurer was dismissed, and he was ordered to pay costs of suit.

DAMAGES FOR A PECULIAR DEATH.

DURING a violent electric storm in June, 1901, Frank R. Willey, of Chicago, put the receiver of a telephone to his ear to talk to his sweetheart. Getting no response, he stepped to the window, and, placing his hand on the radiator, received an electric shock that threw him out of the open window, and resulted in his death. Such was the allegation of facts upon which the administrator of his estate recovered a verdict of $5,000 for his death at the hands of a jury a few weeks ago, although it seems that the very sensationalism of the circumstances would have been enough to defeat the action. The defendants were the Commonwealth Electric Company and the Chicago Telephone Company. It was alleged that the wires of the two companies were crossed and caused the radiator to become charged with electricity.

A TELEPHONE PATENT CASE.

IN March, 1902, the Kellogg Switchboard and Supply Company started suit in the United States Circuit Court, Northern Division of New York, against the Glen Telephone Company, alleging infringement by defendant of letters patent No. 689,953, being a patent relating to the operation of the telephone system. After the commencement of the action and during its pendency the complainant surrendered its letters patent and obtained renewed letters patent No. 12,031, covering the same invention. They then obtained an order of the court dismissing their bill of complaint upon payment of costs, and immediately filed another bill of complaint for the same cause of action. Meanwhile they had not paid the costs, and for this reason the defendant asked that the second bill of complaint be dismissed. The court refused defendant's request, saying that the only effect of non-payment of costs in the former suit was to stay the second suit if they were not paid within ten days.

Kellogg Switchboard and Supply Co. vs. Glen Telephone Co., 121 Fed., 144.

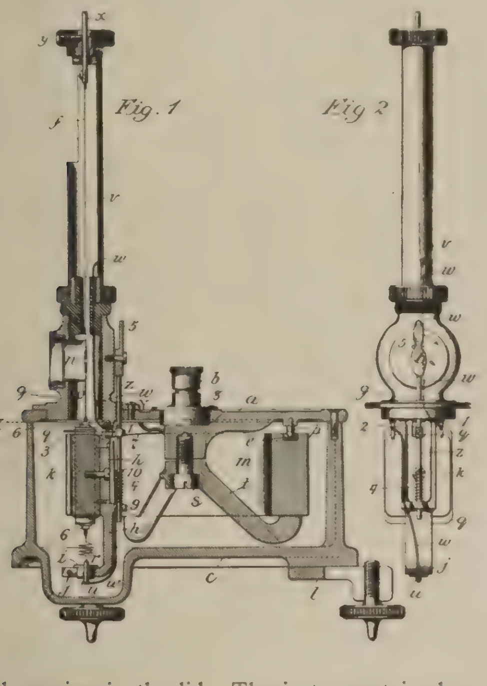
PATENTS ISSUED

REFLECTING GALVANOMETER.

Edward Weston, of Newark, N. J., patents (No. 730,061) a reflecting galvanometer. The object of this invention, a section through which is shown in Fig. 1, is to provide a reflecting galvanometer in which the field magnet can be readily removed and the weight of the mirror and coil taken off the filar suspension when the instrument is not in use, and at the same time to break the connection between the coil and the circuit.

The field magnet, *m*, is fastened to the case, *a*, of the instrument by means of the tripod, *t*, and screw, *s*. The magnet having three holes drilled in its upper surface, in which pins, *p*, projecting from the under surface of the case fit when the tripod is screwed into place.

The magnetizable core, *k*, is turned with exactness, so that its axis, *x*, coincides with the axial line of the magnetic field of the pole pieces and passes through the mathematical centre of the cylindrical opening in the lid. The instrument is shown in Fig. 1 ready for use, the eccentric, *s*, being in a vertical position. When it is desired to move the instrument, the cam, *s*, is rotated from left to right, causing the rod, *z*, and arm, 3, to be lifted by spring 4, and hence lift the coil, *q*, and mirror, *n*, so that their weight is removed from filar suspension, *f*.



The act of rotating cam, *s*, raises the spring, 7, from connection with conductors *w w*, and breaks the circuit to the binding posts.

The instrument is provided with levelling screws and a spirit level. The construction of the instrument is such that the movement may be removed for repairs and replaced without disturbing its adjustment.

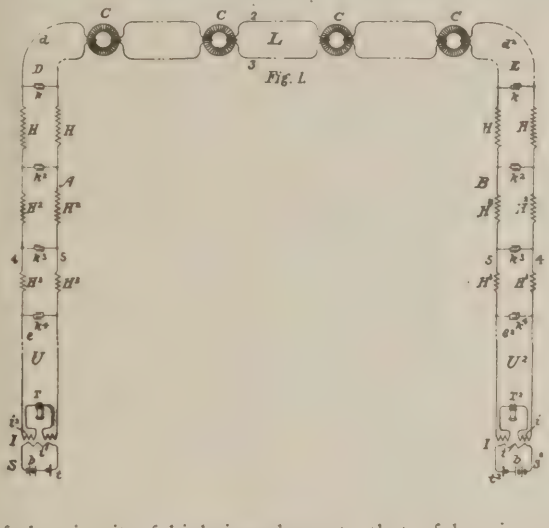
Fig. 2 shows a side view of the movement.

LOADED CIRCUIT.

Howard S. Warren and George A. Campbell, of Newton, Mass., patent (No. 729,709) a loaded electric circuit and assign their patent to the American Telephone and Telegraph Company, of New York.

The invention, which is shown in Fig. 1, relates to a method of loading the intermediate or trunk line between a subscriber's station and a loaded trunk line, its object being to prevent the depreciation in transmission due to an abrupt change from the low impedance of an unloaded line to the high impedance of the loaded trunk line.

In Fig. 1, *L* shows the loaded trunk line, and *A* and *B* show the two ends of the line connecting two stations. The parts *A* and *B* are provided with self-induction coils, inserted in series, as shown, and condensers inserted in parallel. The inductances of the coils and the capacities of the condensers are so fixed as to divide the line into a number of sections in which the impedance diminishes from the loaded trunk line *L* toward the connected stations, thus affording a gradual transition from the portion of the circuit of high impedance to that of low impedance.



For example, if a section of the main line has an impedance of 3,000 ohms and the connecting line is to consist of six sections, the diminishing impedances of the sections will be as follows: 2,400 ohms, 1,850 ohms, 1,425 ohms, 850 ohms and 650 ohms, the sections, of course comprising the same length of line.

TRANSPOSITION DEVICE.

Frederick William Sorg, of Englewood, New Jersey, patents (No. 731,239), a telephone circuit. The object of this invention is to provide a simple and efficient means for making transpositions in telephone lines. At the desired points the lines are transposed by being hooked around the insulators, bent back and fastened with a sleeve as shown in Fig. 2. Fig. 3 shows the application of the sleeve to the wire. In this arrangement the sleeves are given several twists after being placed on the wire and thus complete a closed loop around the insulator and also make it possible to avoid cutting the wires when transposing.

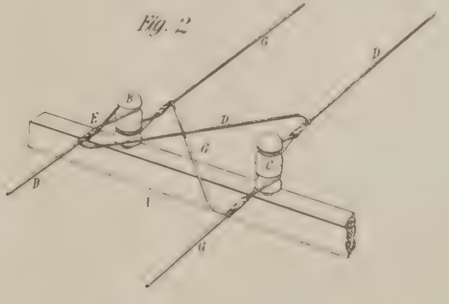


Fig. 2

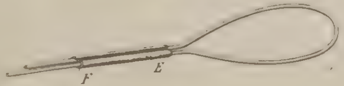


Fig. 3

The Week's Messages.

FINANCIAL

NICHOLASVILLE, KY.—The Jessamine Home Telephone Company has declared a quarterly dividend of 2 per cent. on the capital stock of $30,000. It now has over 500 telephones in Nicholasville and Jessamine county, and over its lines go at least four-fifths of all the telephone messages in Jessamine county.

DETROIT, MICH.—At the annual meeting of the Michigan Telephone Company the report of the treasurer showed that the earnings of the company for 1902 were $1,549,531. The expenses for the same period were $1,632,230, leaving a deficit of $82,699. The total deficit of the company, as shown by the ledger balances December 31, 1902, amounts to $501,296. Loans and accounts payable on same date amounted to $2,538,176.

CLINTON, MO.—At a meeting of the directors of the Missouri Union Telephone Company, held in Clinton, applications were received for $7,500 worth of stock by the present stockholders, and it was ordered issued.

ROCHESTER, N. Y.—The directors of the Stromberg-Carlson Telephone Manufacturing Company have declared a dividend of 2½ per cent. on common stock and 1¾ per cent. on preferred stock, payable July 1.

NASHVILLE, TENN.—The statement of the earnings and expenses of the Cumberland Telephone and Telegraph Company for the month of May compares with same month last year as follows:

May—	1903.	1902.	Increase.
Gross	$282,669	252,153	30,516
Expenses	166,368	159,137	7,231
Net	116,301	93,016	23,285
Charges	21,470	18,475	2,995
Balance	94,831	74,541	20,290
Subscribers	98,560	85,150	13,410

The balance sheet as of May 31, 1903, follows:

Resources—		
Invested in plant		$13,508,470
Invested in real estate and buildings		472,843
Material on hand		252,616
Stocks and bonds		212,024
Cash		59,367
		$14,505,322
Liabilities—		
Capital Stock	$10,699,750	
Bonds	1,285,000	
Surplus	893,047	
Reserve	629,351	
Balance bills and accounts payable	530,485	
Bills payable for real estate	34,100	
Reserve for contingent liabilities	188,558	
Undivided profits	245,028	
		$14,505,322

FRANCHISES

PORTLAND, IND.—The city council has sustained the mayor in his veto of the ordinance granting a franchise to the Hoosier Telephone Company. A new ordinance will be passed which will contain a rate clause, and provide when the work of erecting the plant shall begin, etc. The company proposes to operate in twenty-one counties of the State.

OSBORNE, KAN.—An ordinance granting to the Natoma Central Telephone Company the right to construct, operate and maintain a telephone exchange and toll line within the corporate limits of the city of Osborne was read the first time and referred to the judiciary committee.

WHITMAN, MASS.—A hearing was given recently in response to a petition of the Whitman Home Telephone Company for a franchise for an exchange in Whitman. J. J. Dowd, of Brockton, representing the new company, said if the location was granted the lines would be erected at once. A hearing was given at the Rockland town office on petition of the Rockland Home Telephone Company, which asks for the same privileges in Rockland. The company is composed of the same men as is the Whitman Company. The selectmen will render a decision later.

BABYLON, N. Y.—Paul E. De Fere, of Brooklyn, appeared before the village board and formally petitioned for a permit that would enable the New York and Long Island Telephone Company to continue its line to the village. It is the intention of the company to continue the line through to Patchogue, and it is expected to have it in working order in Babylon, with a central office, inside of ninety days.

PLATTSBURG, N. Y.—The common council of this city has voted to grant a telephone franchise to J. Alexander Van Liew, of Albany.

CINCINNATI, O.—A foothold in Cincinnati is being sought by the Citizens' Telephone Company, which operates in Clermont and adjoining counties in Southern Ohio. The company has secured a franchise from the council of Madisonville to erect poles and string wires in that village.

HAMILTON, OHIO.—The Oxford Telephone Company has been granted a franchise to erect and maintain poles and wires for telephone and telegraph purposes along certain turnpikes in this county.

NASHVILLE, TENN.—There is talk of Harry Myers, of the Memphis Telephone Company, renewing his efforts to secure a franchise for an Independent telephone company for this city.

BEAUMONT, TEXAS.—The board of county commissioners has granted two franchises for telephone rights of way. The first was to Frank Smith, and gives rights of way over the county road from Sour Lake station to the Hardin county line. A similar franchise was granted to C. C. Conroy, representing the Beaumont-Northwestern Telephone Company.

CHATHAM, VA.—The town council has decided to sell to the highest bidder the telephone franchise of Chatham. A gentleman from Pulaski has been looking into erecting a local exchange here, and according to the new constitution the franchise has to be sold to the highest bidder.

CHESTERFIELD, VA.—The Virginia Telephone Company has petitioned the board of supervisors to construct lines along the public roads of Chesterfield county. The board entered an order granting the petition for such rights.

ELECTIONS

HOLTON, KAN.—At a regular annual meeting of the stockholders of the American Independent Telephone Company the review of the business of the fiscal year just closed showed that the company had made a large increase in its business. The following officers were elected for the ensuing year: D. K. Rinehard, president; F. H. Rinehard, vice-president; G. C. Dimm, treasurer; W. M. White, secretary, and DeVere Rafter, general attorney.

WESTMORELAND, KAN.—The Westmoreland Telephone Company has elected A. A. Richards president, J. H. Cooper vice-president, E. G. Forrester treasurer and A. H. Reed secretary; directors, A. A. Richards, E. G. Forrester, M. T. Walden, J. H. Cooper and W. F. Challis. The two systems owned by C. P. Brown and S. W. Cooper have been purchased by this company. The construction of new lines into the country will be pushed as rapidly as possible.

RICHMOND, MASS.—At a recent meeting of the Richmond Telephone Company a reorganization was effected to meet legal requirements in a movement for incorporation. A board of five directors was elected, as follows: W. H. Sherrill, C. H. Dorr, John R. Ayer, A. G. Kiltz and Chester Huntington. The directors then chose these officers: President and general manager, W. H. Sherrill; vice-president, C. H. Dorr; secretary and treasurer, A. G. Kiltz. The value of shares was fixed at $70, payable the 25th, which will give the company a paid-up capital of $1,610. The officers as a committee were instructed to take steps for immediate incorporation.

THE WEEK'S MESSAGES—Continued.

MERCER, ME.—The annual meeting of the stockholders of the New Sharon & Norridgewock Telephone Company was held here recently. The officers are: President, A. C. Greenleaf, of Farmington; treasurer, A. B. Dunton, of Mercer; clerk, C. H. Allen, of Mercer.

UNITY, ME.—At a meeting of the stockholders of the Unity Telephone Company, J. W. Harding, of Dixmont, was elected a director of the company. It is probable a line will be constructed to Hampden.

FOREST CITY, PA.—The new directors of the Northeastern Pennsylvania Telephone Company are: W. E. Perhom, E. H. Ledyard, F. J. Osgood, F. E. Benson and D. R. Braman.

RATES.

GALESBURG, ILL.—The Galesburg Union Telephone Company has asked the council to change its ordinance so as to allow a sliding scale of rates to be adopted.

BUTTE, MONT.—The Rocky Mountain Bell Telephone Company made official announcement that telephone rates would be increased fifty cents per month on all party-line telephones in Butte.

MIDDLETOWN, N. Y.—The directors of the Orange and Sussex Independent Telephone Company held a meeting recently to revise rates.

COMBINATIONS

BLACK ROCK, ARK.—B. F. Biggers has sold his Randolph county system of telephone lines to the Doniphan, Mo., Company. This company and the Lawrence County Home Company have worked in unison.

CONVERSE, IND.—A stock company has been organized here with a capital of $25,000 to take over and operate the Converse telephone plant owned by Barger & Son. The consideration is $8,000. The new company will make extensions and otherwise improve the plant.

MANSFIELD, PA.—The Citizens' Mutual Telephone Company has absorbed four new local lines.

MEMPHIS, TENN.—The Progress Telephone Company, of Bolivar, has been absorbed by the Memphis Telephone Company. A force of workmen are at work connecting Memphis and neighboring towns.

COMPETITION.

COVINGTON, GA.—A warm fight is being waged between the Southern Bell Telephone Company and the Covington Telephone Company. Prior to two years ago the Bell Company furnished local service for the town, but at that time a local stock company was organized which has since done most of the local business. Now the Bell Company wants patronage, and is trying to put in telephones and is reducing the price. In some places the company is offering them free of charge.

MISCELLANEOUS

HALIFAX, N. S., CAN.—The Nova Scotia Telephone Company has re-elected the old board of directors, Dr. C. F. Fraser, B. W. Chipman, Robie Uniacke, B. F. Pearson, C. P. Lise, R. L. Borden and Dr. A. C. Cogswell. The capital stock of the company is $450,000. Total earnings for the year were $111,007.83. Total expenses, $79,163.77, leaving a balance of $31,844.06, which was carried to the profit and loss account, out of which a six per cent. dividend was paid on the capital stock and a small balance carried to rest.

INDIANAPOLIS, IND.—Notices to telephone corporations are being sent out by the Auditor of State that the assessment for taxation of these companies will be made at the first session of the State Tax Board, beginning August 1, and that all appeals and arguments by such companies will be heard on July 28, 29 and 30.

INDIANAPOLIS, IND.—The striking linemen of the Central Union Telephone Company have held out for more than four weeks. The situation has assumed a serious phase. The company procured police power for alleged "watchmen." These "watchmen" turned out to be linemen, who were put to work stringing and repairing wires. The strikers attempted to confer with them while at work, but were met with a volley of bullets from revolvers. One striker was shot in the shoulder. The police powers have been revoked.

SMITH CENTER, KAN.—The Farmers' Telephone Company, of Reamsville, is considering a proposition of the Exchange Telephone Company of this place regarding connections with the home company's line at Reamsville.

BOSTON, MASS.—The instrument output of the American Telephone and Telegraph Company for the month ended May 20 shows a considerable decrease in the gross output as compared with last year. Comparative figures for the month and since December 20, as compared with last year, are as below:

	1903.	1902.	Dec.
Month ending May 20:			
Gross output	102,066	104,661	2,595
Returned	32,815	32,441	*374
Net output	69,251	72,220	2,969
Since December 20:			
Gross output	512,456	492,456	*20,000
Returned	192,952	184,526	*8,426
Net output	319,504	307,930	*11,574
Total oustanding	3,469,824	2,833,942	*635,882

*Increase

RICHMOND, MASS.—At a meeting of stockholders of the Richmond Co-operative Telephone Company several matters of importance were acted upon. The entire line is now completed and in readiness for the instruments. Manager W. H. Sherrill submitted a full report.

CANANDAIGUA, N. Y.—The Inter-Lake Telephone Company has issued a new list, showing 322 patrons, and the list is still growing.

MIDDLETOWN, N. Y.—The Orange County Telephone Company, of Middletown, has added to its list of patrons, making the number 659.

TROY, N. Y.—The Rensselaer Telephone Company's lines have been connected with Albany, Schenectady, Cohoes and Waterford.

UTICA, N. Y.—An additional list, containing the names of 148 subscribers, has been issued by the Home Telephone Company. It will be but a short time before the company will have 2,500 telephones in working order. A new copper-line circuit from Herkimer to Little Falls has been completed, and also one from Mohawk to Paines Hollow, connecting with the Richfield Springs and New Berlin circuits, and points south of the latter place.

New Construction in the Field

ASHLAND, ALA.—Dr. Thomas Northen is contemplating building a telephone line from this place to Goodwater.

LODI, CAL.—Lillie Bros. will soon have completed the Farmers' telephone line, running from Lodi to about five miles north of Stockton. There are ten subscribers on this line, who own the line.

REDLANDS, CAL.—The Home Telephone Company has begun laying the lines underground. Local capitalists have been interested in the enterprise, and have bought into the company so that they have a majority interest. K. C. Wells, president of the Union Bank, is now at the head of the business.

HUME, ILL.—The Hughes telephone system in this county is being improved. A line is now being put up from Newport to Clinton, by way of Hillsdale. A through line from Cayuga to Terre Haute will be constructed.

BLOOMFIELD, IND.—The New Home Telephone Company is extending its line to Linton and Jasonville. The line from Koleen to Owensburg will also be completed. The poles have been in place for over a year.

FAIRMOUNT, IND.—The Citizens' Telephone Company is putting in a line to Point Isabel, and will connect with Swayzee.

RICHMOND, IND.—The board of directors of the Richmond Home Telephone Company has instructed its superintendent to order the necessary cables, switchboards and other materials to increase the capacity of the plant to 2,500. Some additional copper toll lines are under contemplation with a view to increasing long-distance facilities in Western Ohio and Northern Indiana.

BOXHOLM, IOWA.—The Boxholm Telephone Company will buy a new switchboard.

ELKADER, IOWA.—The Standard Telephone Company is overhauling its lines between Elkport, Colesburg and Guttenberg.

GREELEY, IOWA.—Messrs. Laxson and Dunn, of the Inter-State Telephone Company, were recently looking over their lines with the idea of making improvements.

SHENANDOAH, IOWA.—Mr. Marsh, from Tarkio, Mo., was in town recently making arrangements to make connections between the Mutual Telephone Company here and the Mutual of Tarkio.

WASHINGTON, IOWA.—F. W. George, superintendent of the Western Electric Telephone Company, was here recently making plans and specifications for the new telephone exchange. The old poles, wire and office outfit are to be entirely replaced by new and modern equipment.

THE WEEK'S MESSAGES—Concluded.

MARYSVILLE, KAN.—The Axtell Telephone Company is setting poles for a line in the country. It will probably be extended to St. Bridget.

ALMA, MICH.—The Union Telephone Company has completed a long-distance line into Rathbone.

BARNESVILLE, MINN.—A rural telephone line is being constructed between Wolverton and this city, and will connect with the local exchange. J. H. Swanson, who is superintending the work, expects to have the line in operation in a few weeks.

BROWNSDALE, MINN.—The new addition to the Brownsdale telephone exchange, which has been built west on the Lansing road, has been completed as far as Pat Gilling.

EDGERTON, MINN.—The Enterprise Telephone Company recently completed a line to Woodstock and Lake Wilson.

NEW RICHLAND, MINN.—At the solicitation of many farmers and others on the line, H. Jaehning, of the New Richland exchange, will construct a telephone line to Bath. The line will be twelve miles in length and will extend into Freeborn county.

LINCOLN, NEB.—The contract for installing the new plant for the Western Union Independent Telephone Company has been let to the General Engineering Company of Chicago, whose secretary, H. J. Minhinnick, is now in the city. Work will be begun at once.

MARS HILL, N. C.—The Ivy Telephone Company is contemplating the building of a line to Marshall, touching Grapevine, Halewood and other places. This company has a line to Asheville with connections east of there, and they also cover the Ivy section and will build on into Yancey county.

SALISBURY, N. C.—The Salisbury Telephone Company is building a system in Spencer.

WINTON, N. C.—Mr. McAnge, of Suffolk, was in town recently. He is constructing a telephone line from Winton to points in Bertie and Hertford counties, and will connect his line with the Hertford County Telephone Company at Tunis, three miles east of this place.

ITHACA, N. Y.—The Home Telephone Company is about to extend its line from Seneca Falls to Ovid, having secured the right of way for its poles and wires. The company also talks of extending the line from Ithaca to Farmer, and will join the line from Ovid.

ITHACA, N. Y.—The Ithaca Telephone Company has opened the line with Binghamton and vicinity.

LOCKPORT, N. Y.—The Orleans County Rural Telephone Company, a branch of the Home Company, has purchased a lot at Olcott, and it is understood will erect a telephone exchange thereon.

OWEGO, N. Y.—Manager Bloodgood, of the Owego telephone exchange, has secured enough subscribers to warrant a line up the river and over to the Hoagland district. Another will extend over into Tioga, and others are partially arranged for.

PULASKI, N. Y.—The Black River Telephone Company, which was recently granted a franchise by the board of trustees to erect its poles and string wires through the streets of this village, has commenced the work preliminary to the installing of a telephone exchange in Pulaski.

BURTON, OHIO.—The Burton Telephone Company has a force of men steadily at work improving and extending its lines in Southern Geauga county in charge of Manager A. D. Baird.

CLEVELAND, OHIO.—The United States Telephone Company is building its line from London to Springfield, where it will connect with the new system.

TOLEDO, OHIO.—The Toledo Home Telephone Company has been receiving large consignments of new cable, and the work of placing it in the old and new conduits is progressing rapidly. The demand for new telephones is greatly in excess of the capacity of the plant, but the new cable will admit the addition of 1,000 new telephones. The directors at a recent meeting decided that it would be unnecessary to issue additional bonds.

AMBLER, PA.—The work of rebuilding and extending the Keystone telephone system in Ambler progresses. Cables are being run through the built-up portions of the town.

BIGLERVILLE, PA.—The United Telephone and Telegraph Company is rebuilding its lines in this section.

LOYALSOCK, PA.—The Loyalsock Telephone Company has found it necessary to secure an amendment to its charter. On its approval the work of the new company will proceed rapidly. The work of construction will probably begin early in July.

TRADE NOTES

The Varley Duplex Magnet Company of Phillipsdale, R. I., and Chicago, Ill., have lately issued a catalogue describing their products, which consist of electro magnets and solenoids of all kinds imaginable. The catalogue contains valuable data concerning magnet wire, solenoids, and electro magnets. Information concerning lifting magnets also receives attention. Curves are given which show characteristics of these lifting magnets.

The Stromberg-Carlson Telephone Manufacturing Company, of Chicago, Ill., and Rochester, N. Y. has recently made the following sales: A 100 drop switchboard to the Farmers' Telephone Company of Perrysville, Ohio; a drop switchboard and a supply of construction material to the Pixley Dundas Telephone Company, of Wakefield, Ill.; a quantity of telephones and construction material to the Lynn Center Telephone Company of Galva, Ill., and a switchboard, telephones and construction material to the Tri-County Telephone Company of Creston, Ill.

The Wharff Eaton Co., Inc., of 35 Wormwood street, Boston, are manufacturing some novelties in the way of signs for Independent telephone companies at prices which should make them very attractive to concerns operating in the field. These signs, which are made in either etched or enameled brass or nickel plate, have a much richer and more aristocratic appearance than the ordinary telephone sign. There could be no possible objection to the placing of one of these in the rotunda of the finest hotel or on the front of the most exclusive drug store. They are furnished round, mounted on a wooden drum or flat with a chain hanger.

In the advertising section is shown a picture of one type of telephone sign which this company manufactures. The cut by no means does the original justice. The body of the sign is of richly polished brass and the shield is made of the proper colored enamels which are run in cavities etched out for them.

A full line of telephone sign and emblem transparencies for tarnsferring to pay station windows, booths, etc., form also a product of the company. Any telephone company applying will be furnished with a free sample transparency.

The Independent Telephone Traffic Company, of Cleveland, is the company's representative for Ohio. To them all communications from that State should be addressed.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

SECOND-HAND Bell type switchboard, 180 drops installed. In first class condition and good working order; $200. Address D. E. F., care The American Telephone Journal, New York.

TELEPHONE system, 200 subscribers, paying $2,000 net per year and increasing. Good long distance connections; invoices $7,200; standard construction, fine service, no competition, good rates. The property will be closed out August 1st to highest bidder. Address BOX 59, care The American Telephone Journal, New York.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

A BELL MANAGER wants position as manager or assistant with first-class Independent company. Will be at liberty July 1st. Address BOX 58, American Telephone Journal, New York.

DRAFTSMAN familiar with telephone cable distribution, handling men, making out estimates, etc. State experience and salary expected. Address BOX 56, care The American Telephone Journal, New York.

POSITION as manager or superintendent of exchange, 200 to 300 lines; five years' experience on board, toll lines and construction work, grounded or metallic; aged 38; married, sober, industrious and reliable. Address A. W. Cripps, Harrison, Ark.

POSITION AS TROUBLEMAN; have had seven years' experience as local and long distance telephone troubleman, and also fire alarm troubleman; Minnesota or Dakota preferred. Address BOX 50, care The American Telephone Journal, New York.

The American Telephone Journal

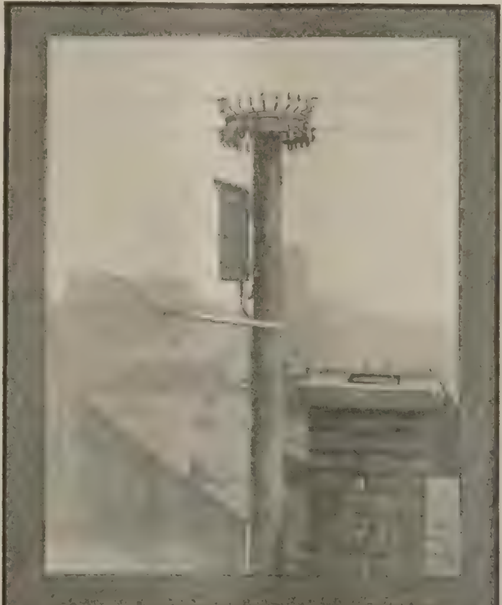
VOLUME VIII SATURDAY, JULY 11, 1903 NUMBER 2

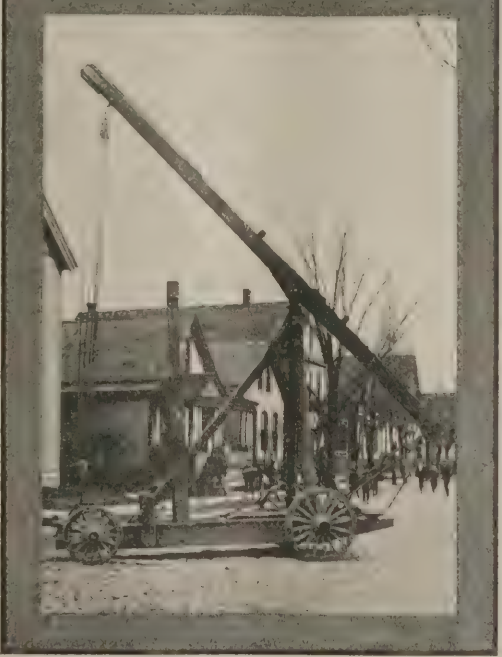
NOVEL FEATURES OF THE FRONTIER PLANT

By George M. Mulhin.

GOOD practice in telephone engineering is nowhere better exemplified than in the plant of the Frontier Telephone Company at Buffalo, N. Y. Every portion of the installation was built in accordance with the best standards of to-day. The switchboard has a present equipment of 8,000 lines and an ultimate capacity of 18,000. There are about 3,500 telephones in actual use. Herein will be presented some of the features of the new system, which will undoubtedly prove interesting reading at this time. Special attention was paid to outside plant. The three illustrations on this page give an idea as to the way in which some of the line work was done. The initial photograph shows the method of entering a subscriber's house. The line wires are brought to glass insulators (no knobs were used), which are supported on a special galvanized iron bracket which is attached to the side of the house. The line fuses are attached as shown, and the wires from the substation end of these go through an enclosed protector and to the substation instrument. The twisted pair may be seen running from the protector into the window. The top of a distributing pole is shown in the next photograph. A great many of these were used in the down town districts. The central figure on the next page shows the inside arrangement of a pole box which has a capacity of 25 lines. The pole derrick shown on the first page was used for raising many of the poles used in the installation. It is found that time and money is always saved by the employment of one of these when any number of poles, especially long ones, are to be raised.

Distributing Box and Ring.





Pole Raising Derrick.

The top figure on the following page is a view of the end of the switchboard, which is given in order to show its peculiar construction. The key desk instead of being horizontal, as is usual, is tilted at an angle tipping downward. This design was inaugurated to allow more room for the operator's knees, while she is sitting at the board, and at the same time giving more space for the banks of jacks and lamps which in an installation of the capacity of this would make the switchboard excessively high. Under the switchboard a trough is provided for the cord weights to hang in, and it allows the use of cords about 1 foot longer than could be used if the trough were not arranged for. The ringing keys for straight and selective party ringing are arranged on a plate in front of the cords with which they are associated and are made in such a way that the last key pressed will remain in a depressed position until another one of the keys associated with the same cord is pressed when the first key will assume its original position. This enables an operator to tell at a glance what party on a line she last rang on that set of cords, and she can, if necessary, ring him again without disturbing other parties on the line.

The underground cables come into a 12x24 foot manhole at the front of the building from which a passage way leads to the basement. The cables are led in hanger ways and through vertical ducts to their proper positions immediately beneath the lightning arrester racks on the distributing boards on the second floor of the exchange building. The cable entrance through the wall into the basement is shown in the bottom illustration on the next page. The photograph only shows half, a similar entry is situated on the other side of the room. The company's conduit system was built of single duct tiles of the "Camp" style. It embraces 29 and a fraction trench miles, averaging 7 and a fraction ducts to the trench. The main line at the office contains 40 ducts. The conduit system covers the best portion of the town very thoroughly, a conduit line being laid out in every alternate block. In the residence portion of the city, the system of distribution is from poles set on the rear property lines. Each block contains 1 to 10 poles, according to its length, and is fed by a separate underground lateral leading directly from the conduit to one pole of the line. Five main lines lead eastwardly and supply the manufacturing and railroad centers. Some 5,000 poles in all have been set in pole lines and in the distributing pole system. All poles over 35 ft. in length are of Idaho cedar, with 25" circumference tops, and butts which run 1" in diameter greater than the top for every 5 feet of length of the pole. Small poles are of Canadian cedar and native chestnut. All the iron fittings used are galvanized to meet the requirements of the standard 4 dip specification.

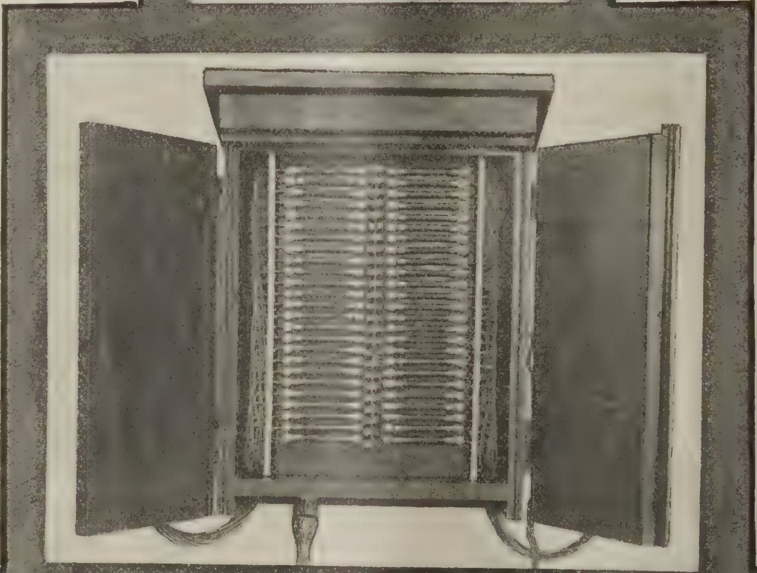
The policy of the company in building a new district in which the business can not be anticipated, is to set tall poles and string what wires are necessary until the full capacity of the line is reached, then a cable is installed. The crossarms on a pole are never allowed to exceed 2, when it is necessary to exceed this number a cable is put up. The following figures give an idea to what extent multipling has been carried out. From the central office, 7,600 pairs of conductors leave in the cables; these conductors appear in 40,000 pairs of binding posts, outside. Only two sizes of overhead cable are used, 25 and 50 pair. The underground cable system comprises 19-400 pair cables leading from the central office. A part of these run to distributing poles in the blocks, a part feed aerial cables on pole lines, and the remainder run into building basements in the office building section of the town. The greater part of the cable is of 22 B. & S. gauge; but where the point to be reached is so far from the central office as to make the circuit resistance in 22 gauge wire exceed 500 ohms, soft 20 gauge cable has been installed to bring the circuit resistance down to that limit. The Kellogg Switchboard & Supply Company designed a special transmitter of the solid back type, to meet these high resistance conditions. The difference between this transmitter and others commonly used lies in the higher resistance of the granular carbon dust. The internal resistance of the ordinary transmitter is about 80 ohms, while the resistance of the Frontier transmitter will measure 320 ohms. Tests have demonstrated that this combination of transmitter and line resistance is as efficient as the ordinary, while the current consumption is very materially decreased. The average transmitter in the Frontier plant is taking about 1-100th of an ampere.

A major type full multiple switchboard of the Kellogg make is used, having 23 sections of three positions each. There are 10 panels per section. Operators' positions are numbered from left to right from 1 to 69. These numbers are painted 2½ inches high with aluminum paint over each position in such a way that they can readily be distinguished from the supervisor's desk. The multiple jacks, which are made on 3-10-inch centers, are arranged in banks of five strips each, every strip containing 20 jacks, and are placed in the customary manner over the answering jacks and line lamps. There are only two conductors running to each multiple-jack. For the operators' talking sets breast transmitters are used throughout the receiver terminals, being on the breast plate from which the receiver cords are taken. Two special operators' jacks are arranged on each position, so that a student or a monitor may work with the regular operator. As now installed the switchboard occupies only one floor of the building. When the ultimate capacity has been installed two floors will be in use, the equipment on the upper floor being a duplicate of that on the first. When this addition has been made there will be no trunking of lines between the two floors. The exchange will be kept full multiple. The board is arranged to ultimately accommodate 400 outgoing trunks.

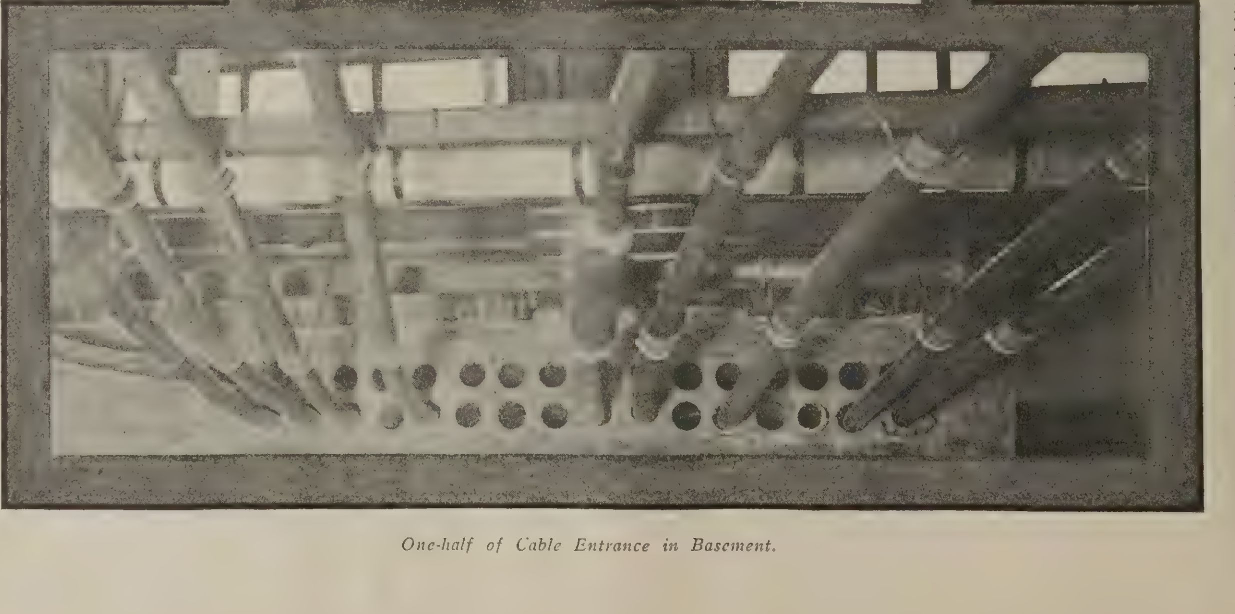
All exposed parts of the switchboard are of polished mahogany. The running boxes for carrying cable are of maple. The relays and other apparatus in the back of the switchboard are protected from dust by a felt curtain guided at the bottom by a wooden strip. When necessary the curtain can be rolled up out of sight like a window blind.

The busy test is the usual one. A click is heard in the head telephone when the tip of the plug is touched to the sleeve of the jack. The condensers for each position are placed in a box directly behind the cord weight, and are plainly numbered. The combination chief operator's and supervisor's desk is of finely finished mahogany to match the switchboard, and is provided with two positions and three panels. Five pairs of cords are provided for each position, with lamps and four-party ringing and listening keys. The desk is so wired as to supervise the operators, a white lamp (there being one for each position) lighting whenever a call comes in on any position, and remains lighted until the operator answers the call.

Switchboard End, Showing Slanting Keyboard.



Pole Box.



One-half of Cable Entrance in Basement.

TELEPHONE EXCHANGE ENGINEERING—ARTICLE X

CHIEF OPERATOR'S CIRCUITS

By Ray H. Albion, D. T. Libby and Chas. A. Simpson.

If any of the subscribers have any complaints the chief operator will order one of her service lines connected in multiple with the line of the complaining subscriber, as shown in Fig. 11. These special circuits are wired out to an intermediate distributing board terminal strip and all that is necessary to connect them to any subscriber's line is to run jumper wires from the terminals of the circuit to the terminals of the regular subscribers' lines, as shown. After the circuit is thus connected and the subscriber should remove his receiver from the hook to call, then the instant the line relay is drawn up and lights the line lamp at the multiple board, the lamp *A* will also light, since it is connected in multiple with the regular line lamp. The chief operator upon seeing this lamp light will immediately insert her plug *P* in jack *J* and listen to the conversation between the subscriber and the regular operator. The chief operator can also tell how long the regular operator takes to answer the call, as the lamp *A* will remain lighted until she inserts her answering plug into the answering jack. It will be noticed that the 600 ohm winding of the relay *R* is bridged across the subscriber's line in series with the two microfarad condenser *C*. The condenser *C* is inserted to prevent battery from flowing through the relay and thus lighting the subcriber's line lamp at the multiple board. Now, when any of the regular operators call up this particular subscriber the ringing current will pass through the 600 ohm winding of the relay *R*, throwing its shutter and lighting the lamp *B*. When the chief operator sees this lamp light she inserts her plug *P* into jack *J* again, and listens to see how long it takes the subscriber to answer and also listens to the conversation. Thus this circuit is the means of improving the service.

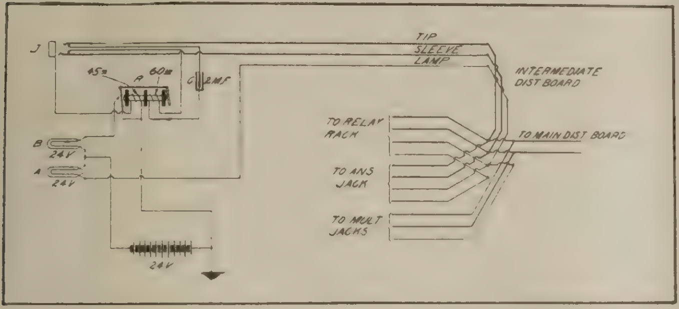


FIG. 11.

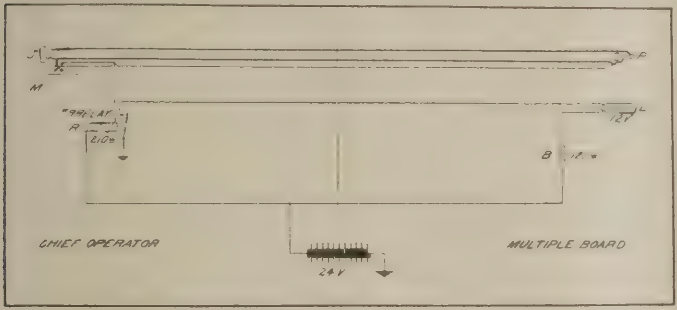


FIG. 12.

By the circuit shown in Fig. 12 the chief operator may call any regular subscriber. The plug *P* and lamp *L* is located in the plug shelf of the multiple board and within reach of a regular operator. The chief operator will depress an order wire key which is wired to the head telephone of the regular operator who is within reach of the plug *P*, Fig. 12, and tells her what subscriber she wants. The regular operator will then insert plug *P*, Fig. 12, into the multiple jack of the subscriber wanted. The chief operator will then insert her plug *Q*, Fig. 8, into jack *J*, Fig. 12, and ring the subscriber in the usual way. When the plug is inserted into jack *J* the contact at *m* is broken. Battery will now flow through the 210 ohm resistance *B*, Fig. 8, through the ring of the jack, Fig. 12, and thence through the cut-off relay to ground, so that during conversation the subscriber's cut-off relay is held up, thus preventing the subscriber's line lamp from lighting. When the conversation is over and the chief operator removes her plug from jack *J*, the contact at *m* closes. Battery will then flow through the 210 ohm relay *R*, through contact at *m*, through the subscriber's cut-off relay to the other side of battery or ground. This will keep the subscriber's cut-off relay pulled up and will also operate relay *R*. Battery will then flow through the 120 ohm resistance *B*, through lamp *L*, through the contact of relay *R* to ground, thus lighting lamp *L*, which is the signal for the regular operator to pull down the connection made with plug *P*.

It is desirable that the chief operator be able to call on any subscriber's line in order to test the speed of the different operators in answering calls. The operators, knowing the chief operator is able to make this test at any time, will be prompt in answering in order not to be caught napping. This test is made by means of the circuits shown in Fig. 13. In Fig. 13 the plug *P* and lamp *L* is located in the plug shelf of the incoming trunk operator's position, and the jack *J* at the chief operator's desk. By means of an order wire key connected directly to the head telephone of the incoming trunk operator, the chief operator will tell the incoming trunk operator to insert plug *P*, Fig. 13, into the desired multiple jack, Fig. 1.

The chief operator will then insert the plug *P*, Fig. 8, into jack *J*, Fig. 13. Plugging into the jack will have the same effect as the subscriber removing his receiver from the hook. Battery will now flow through the 60 ohm line relay, Fig. 1, through the contact of the 30 ohm cut-off relay, through the sleeve of line to the multiple jack, through sleeve of plug *P*, Fig. 13, to sleeve of jack *J*, through sleeve of plug *P*, Fig. 8, through the repeating coil and back over tip side of the same circuits through the contact of the 30 ohm relay to ground, Fig. 1. This will operate the 60 ohm line relay, which lights the subscriber's line lamp in the regular way. When the chief operator removes the plug from jack *J*, Fig. 13, the operator who answered the call will receive the disconnect signal in the regular way and will then pull down her plug. Battery will then flow through the 210 ohm relay, *R*, through contact of jack *J*, through tip of plug *P* to tip of the multiple jack, Fig. 1, through the contact of the 30 ohm cut-off relay to ground. This will operate the relay *R*, Fig. 13, which will light the lamp *L*. When the incoming trunk operator sees the lamp *L* light she will pull down the connection.

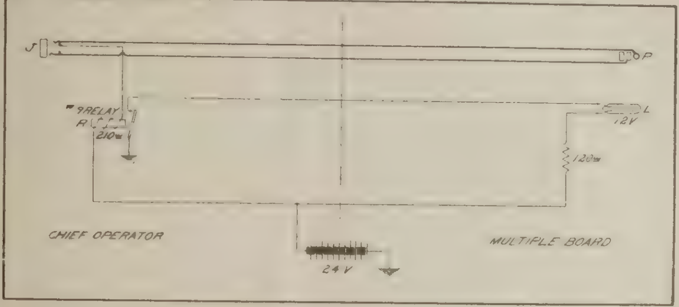


FIG. 13.

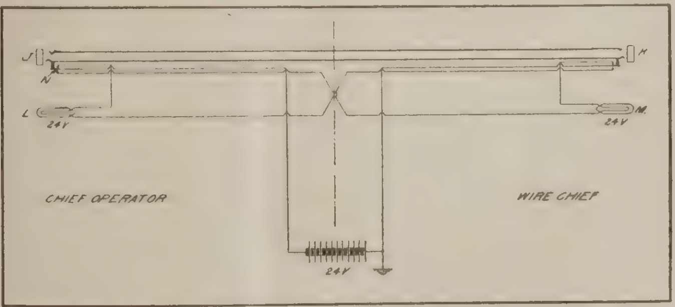


FIG. 14.

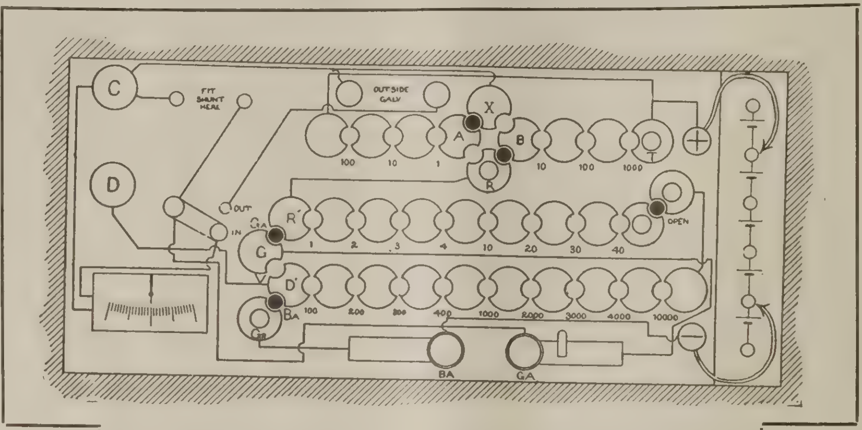
If the chief operator wishes to speak to the wire chief she inserts plug *P* into jack *J*, Fig. 14. This will cause a battery to flow through contacts at *n* of jack *J*, through lamp *M* to ground, thus lighting the lamp at the wire chief's desk. The wire chief may call the chief operator in the same manner by plugging into jack *K*.

ELECTRICAL MEASUREMENTS—ARTICLE XV.

By Arthur Vaughan Abbott.

BEFORE investigating the various tests and measurements which may be made with the Wheatstone Bridge it is desirable to study somewhat more in detail the construction of this instrument as it is usually found upon the market. Fig. 1 shows the top plan of one form of portable testing set that is exceedingly conveniently arranged for the testing engineer, while Fig. 2 gives the circuits of this instrument. Fig. 3 shows the top plan together with the circuit connections of a type of Wheatstone Bridge which is in very common use and known as the English Post Office set. Fig. 4 is the top plan of another excellently arranged testing set. A simplified diagram of its circuit is shown above it. Referring to Fig. 1, a battery is shown which is packed upon the right-hand side of the box containing the testing set. From the battery a lead passes to the battery key *B A*. This is a spring key, and is inserted in the circuits, so that the battery is never closed, unless the key is touched by the finger of the inspector. From the key the circuit passes to a brass block marked *G R*. This is a block having a hole drilled in the center into which a metallic plug, carrying a ground wire, can at pleasure be inserted for the purpose of grounding the testing set during special measurements. Directly above the *G R* block is a block marked D^1, which forms one end of the rheostat *D R* in Fig. 2. It is easy to trace the circuit from the negative pole of the battery through the key *B A* to the block *G R*, which is connected to the block D^1 by insertion of a plug shown by the black dot Fig. 1. The circuit then continues through the rheostat arm D^1 R^1 Fig. 2 to the block R^1, which is connected through the base of the instrument to the block *R*. The block *R* can be connected to the blocks *A* or *B* by means of a plug shown in Fig. 1 by black dot. Block *G* is connected through a key marked *G A* Fig. 1 and a small switch with a galvanometer. The switch in this circuit cuts the galvanometer in or out at pleasure. This switch has two contacts, one marked "In" and the other "Out." From the "out" contact and from the other end of the switch leads run to two binding posts on the top of the plan. These binding posts enable the operator to substitute any other galvanometer (for example a more sensitive one) for that which is supplied with the testing set. The circuit from this switch also passes through contacts which are marked "Fit shunt here." These contacts are inserted so that the galvanometer accompanying the testing set may be supplied with a shunt having ranges so that the sensibility of the galvanometer may be reduced to .1 or .01 of its normal value. This shunt consists of a small India rubber box carrying the appropriate resistance coil. By means of the key the galvanometer is constantly protected from injury due to the accidental currents. From Fig. 1 it is easy to see that the block D^1 is connected to *D*, and that block *C* is connected to block *X*. *C* and *D* are the binding posts to which the unknown resistance is connected, which is represented by line *C D* in Fig. 2, while line *D R* represents the rheostat or variable arm of the bridge.

FIG. 1.—Diagram of Coils of Portable Testing Set.



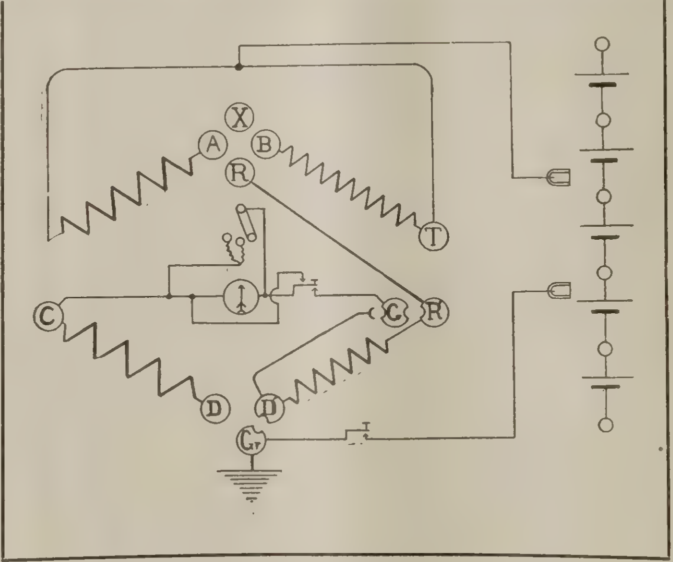


FIG. 2.—Circuit of Portable Testing Set.

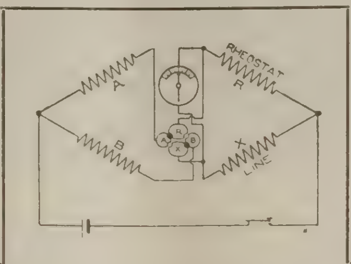
Consider now the *A* and *B* arms, which are usually known as the ratio arms. These are located in the upper part of Fig. 1, marked *A* and *B*, and are similarly indicated in Fig. 2. The arm *A* contains three coils of 1, 10 and 100 ohms each, while the arm *B* contains three coils with values of 10, 100 and 1,000 ohms. By means of the blocks *X* and *R* and *A* and *B* it is possible to reverse the arms of the bridge, as can be seen by a slight study of Figs. 1 and 2. Suppose plugs to be inserted between *X* and *A* and *R* and *B*, as shown in Fig. 1 by black dots. From Fig. 2 it is easy to see that the circuit passes from the battery to *G R*, thence through the rheostat arm D^1 R^1 to the block *R*, thence to *A* and through the *A* arm of the bridge to the other positive pole of the battery. Also the positive pole of the battery has circuit to *T* through the arm *B* to *X*, which, as is seen from Fig. 1, is connected directly to *C*, thence through the unknown resistance *C D* Fig. 2 and to the negative pole of the battery. If now the plugs between *R* and *X* and *R* and *B* are interchanged so that *R* is connected to *A* and *X* to *B*, the circuit will be from the negative pole of the battery to D^1, thence through the rheostat arm to R^1 and *R*, thence through the *A* arm of the bridge and to the positive pole of the battery, while the positive pole of the battery passes through the *B* arm to *X*, thence through the unknown resistance *C D* and to the negative pole. By this means it is evident that the arms of the bridge may be reversed at pleasure, and consequently different multiplying powers can be secured with a less number of coils than in models which are unprovided with a commutating device.

The galvanometer of this model is of the portable D'Arsonval type, the needle being mounted in jewel bearings. It has a sensibility of 2 megohms, that is to say, an electromotive force of 1 volt acting through a resistance of 2 megohms will produce a deflection of 1 division on the scale.

The Post Office pattern of the bridge, shown in Fig. 3, has circuits somewhat differently arranged. The ratio arms of the bridge are shown at *A* and *B*, while the rheostat are marked *r* consists of three sets of 10 coils each. The resistances of the coils are shown in the figure. The battery is joined to the binding posts marked *B B*, for in the Post Office pattern a separate battery is usually required. The connections of the galvanometer and the other circuits of the instrument may be readily discovered by tracing the dotted lines of the diagram and seen to correspond with the Wheatstone parallelogram. In the Post Office pattern the different arms of the bridge are each furnished with four plug holes, one is marked zero, while the other three in each arm are respectively 10, 100 and 1,000 ohms. As no commutator or other reversing arrangement is provided, the ratio of the bridge arms is changed by withdrawing the plug in each arm from such coils as will give the desired ratio.

The form of portable testing set which is shown in Fig. 4 resembles in some respects that shown in Fig. 1. The plan of this set is shown at *A*. In the arrangement of this model the rheostat arms are separated and the ratio arms are inserted between the two parts, as will be seen in Fig. 4. The binding posts *C* and *D* are for the unknown resistance. The battery consists of four cells, each giving an electromotive force of a little over 1 volt, so that the combination supplies a battery having approximately 5 volt potential. The battery and galvanometer keys are marked respectively *Ba* and *Ga.*. A simplified diagram of its circuits is shown above the plan of the galvanometer. The commutating device is operated exactly as the one described above.

FIG. 5.—Circuit of Test Set.



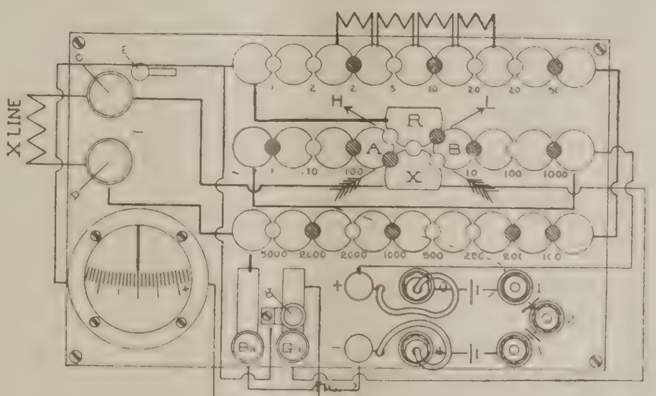


FIG. 4.—Plan of Test Set.

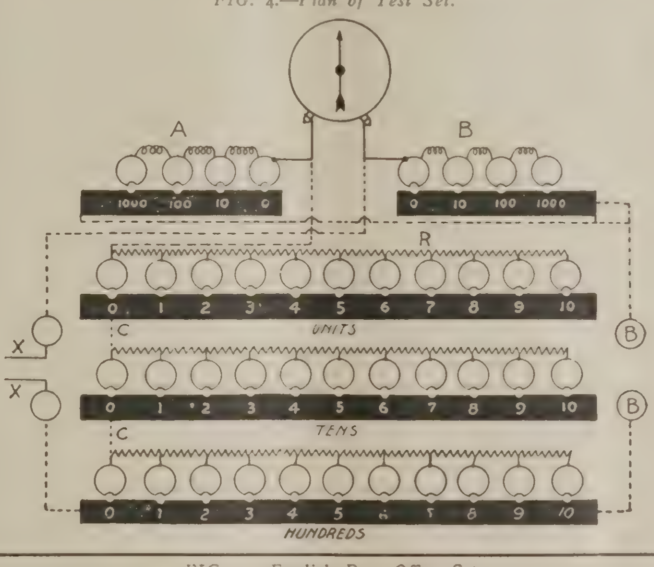


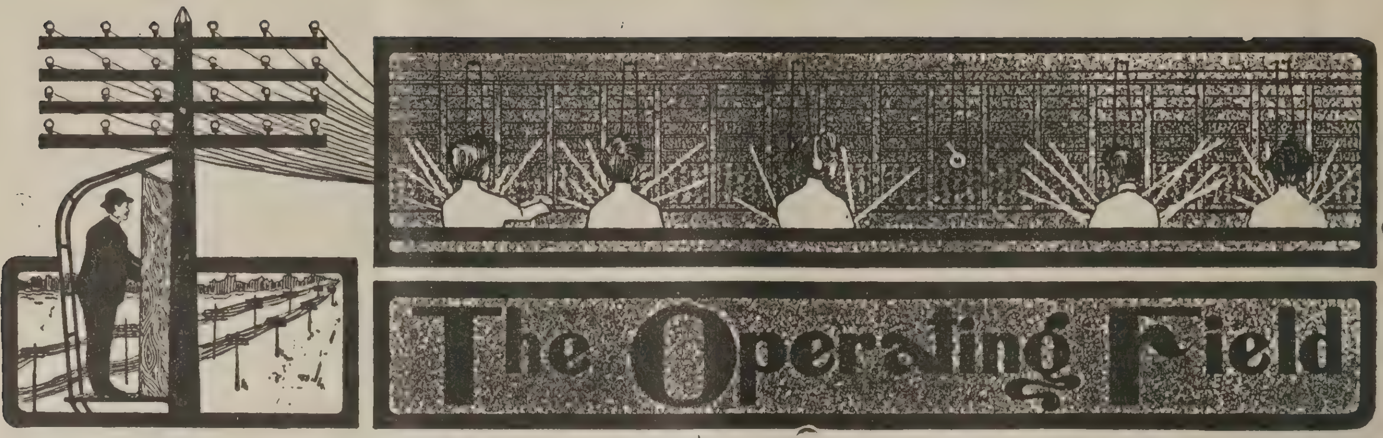
FIG. 3.—English Post Office Set.

The formula for the Wheatstone Bridge, as has been previously shown is $x = \frac{a}{b} d$, in which *a, b, d* and *x* are respectively the resistances of *A* and *B* ratio arms, *d* the resistance of the rheostat arm and *x* the unknown resistance to be measured. The ratio arms shown in model in Figs. 1 and 4 enable the inspector to secure ratios of 1 — 10, 1 — 100 and 1 — 1,000; also 10 — 100, 10 — 1,000 and 100 — 1,000, and by means of the commutator blocks these arms can be reversed, which is equialent to inerting the preceding fraction so that it reads $x = \frac{b}{a} d$. Further consideration shows that the resistance in the ratio arms can be varied without necessarily changing the ratio, that is if the 1 ohm coil of *A* and the 10 ohm coil of *B* are unplugged, the ratio will be 1 — 10, and the resistance of the arms will be respectively 1 ohm and 10 ohms, while, if the 10 ohm coil in *A* is unplugged and 100 ohm coil in *B*, the same ratio is obtained, and the resistance in the arm is greater. Naturally the accuracy with which measurements can be made will depend somewhat upon the relation between the resistance in the bridge arms and that which it is desired to measure, and the best results are obtained by setting the arms in accordance with a table furnished by the manufacturer with the bridge.

In the model shown in Fig. 3 each of the arms *A* and *B* have three coils of 10, 100 and 1,000 ohms each, but there are no commutator blocks, and so the reversal of the bridge arms is obtained by actually changing the ratio, thus, if the 10 ohm coil is unplugged in *A* and the 100 ohm coil in *B*, $a = \frac{10}{100} = .1$, but if the 100 ohm coil be unplugged in *A* and the 10 ohm coil in *B*, the ratio will be $\frac{100}{10} = 10$. Thus the model of Fig. 3 has only three ratios, 1, 10 and 100.

The beginner in the use of the Wheatstone Bridge should commence by making a number of measurements of various resistances, such as the coils of relays, ringer magnets, receivers, etc. All resistances of these dimensions will follow entirely within the normal range of the rheostat, and for this purpose the bridge, if on the types of Fig. 1 or 4, may have the commutator plugs inserted in either diagonal, and the arms *A* and *B* unplugged with say 100 ohms each. The terminals of the resistance to be measured are to be connected to the binding posts *C* and *D*. The inspector then makes a guess as to the probable resistance and unplugs in the rheostat the estimated amount. Suppose for example the coil to be tested be a 1,000 ohm ringer. In a general way its resistance will be somewhere in the neighborhood of that amount, and the inspector naturally unplugs the 200, 300 and 400 ohm coils. The battery key is then depressed with the forefinger of the right hand, and with the middle finger the galvanometer key is given a light tap. It is always desirable to close the battery key first and then to touch the galvanometer key very lightly, so that the galvanometer may not be deflected too violently in case the estimated and actual amounts of the unknown resistance are widely different. If now the needle of the galvanometer swings towards the right hand, it indicates that the resistance in the rheostat is too small and that more should be added, while on the contrary if it swings towards the left hand it indicates that the resistance in the rheostat is too great and should be decreased. Suppose the galvanometer swings forcibly to the right hand, the inspector naturally will unplug the 100 ohm coil and test again. Under these circumstances suppose the needle swings feebly to the left hand, this indicates that 100 ohms in addition to the previously unplugged resistance is too much, and so it is best to plug up the 100 ohm plugs are out. The 30 and 20. Again touching the galvanometer key, suppose the needle to swing very feebly to the right hand. Unplugging the 1 ohm coil and again touching the galvanometer, we find that the needle remains at zero. Looking at the rheostat one sees that the 400, 300, 200, 40, 30, 20 and 1 ohm plugs are out. The total resistance is therefore the sum of these numbers, or 991 ohms. The method of using the type of bridge shown in Figs. 3 and 4 is exactly the same and so needs no further explanation. As the rheostat in the model of Fig. 1 contains 21,110 ohms, and as the ratio of its arms can be made 1 to 1,000, the total possible capacity of the bridge is 21, 110,000 ohms. In Fig. 3 the capacity of the rheostat is 1,110, and the ratio of its arms 1 to 100, so that the total capacity is 111,000. Very frequently the Post Office pattern shown has four rows of coils, and under such circumstances its capacity rises to a little over 1,000,000 ohms. By means of the rheostat the model in Fig. 1 can be made to give a ratio of 1,000 to 1, and consequently can theoretically measure 1000th of an ohm, while the Post Office pattern can only give a ratio of 100 to 1. Under ordinary circumstances such a bridge cannot be relied upon to measure much less than 1-100th of an ohm, or much more than a megohm. By using a highly sensi-

(*Continued on page 23.*)



The Operating Field

YORK STATE COMPANY COMPLETES ITS LINE.

THE York State Telephone Company has succeeded in having vacated the injunction which Mrs. Harriet Wells secured restraining it from constructing and maintaining a line in the highway past her farm near Whitney Point, N. Y. By this settlement the Independent company has been able to complete its line between Whitney Point and Cortland, the section in front of Mrs. Wells' property being the last link in its long distance line in the northern part of the State. Another injunction prevented the company from building its line along other property near the village, but the company avoided the effect of that by changing its route.

STREET RAILWAY TELEPHONES FOR TOPEKA.

THE Vinewood Branch of the Topeka Railway Company, at Topeka, Kan., will be the first to operate electric cars in this part of Kansas by the use of telephones. Seven Independent telephones will be put at intervals on the six miles of line on that branch of the street railway system, and the conductors of the trains will make their own connection in the country through which the branch is built by use of the telephones. There will be one telephone at each end of the line and five more at intervals along the road. They will be operated on the Independent Telephone Company's long distance wires.

FREMONT COMPANY INCREASES CAPITAL STOCK.

AN increase in the capital stock of the Fremont, Ohio, Home Telephone Company from $60,000 to $100,000 will shortly be made. The company was organized in February, 1899. A new switchboard is required to take care of the company's increasing business and to provide for this $15,000 of the new stock will be sold at par. It is stated on good authority that the stock will go on an 8 per cent. basis the first of next January. The company is now operating an exchange of 750 telephones, beside about 50 farm line subscribers and 10 miles of metallic circuit toll line. The franchise runs for 25 years. The officers are: President, S. Brinkerhoff; vice-president, Charles M. Russell; secretary, R. J. Christy; treasurer, J. M. Shennan; general manager, R. T. Larkins.

FEDERAL COMPANY EXPANDS.

THE Federal Telephone Company lately took possession of the lease of the Westmoreland telephone exchange in Greensburg and is rapidly constructing a toll line into the Westmoreland county seat, says *Money*. As a result, in the near future, Westmoreland county subscribers can use the Federal toll lines to Federal subscribers in 71 towns. These include 17 in Westmoreland county, 16 in Allegheny county, 6 in Fayette and 32 in Washington county. In addition to these 71 towns on the Federal lines subscribers in Greensburg will be able to secure connections to more than 100 other places in Fayette, Washington and Greene counties; in West Virginia and in Ohio, over lines with which the Federal has a traffic arrangement. It is the intention of the Federal to build its own toll line to Latrobe, Derry, Ligonier and Johnstown. For the present no Pittsburgh connections can be given, but the company is hopeful for such a convenience in the near future. As plans are now being drawn for the rebuilding of the Westmoreland exchange in Greensburg, and the placing of all circuits in aerial cables, no effort will be made until a little later to increase the number of subscribers in Greensburg, as the nearness of the electric light wires renders the service too noisy at night. New subscribers will be connected as soon as the plant has been rebuilt. The Federal Company has authorized the increase of its capital stock to $2,500,000, to be issued as needed. The capital is now $600,000, which is the actual amount of the outstanding stock. The additional stock will be used for the purchase of new plants and the pushing forward of new construction.

SUCCESSFUL WORK IN UTICA.

By W. H. Campbell, *Special Correspondent.*

THE people of Utica, N. Y., and its suburban towns are recognizing the far superior service of the Utica Home Telephone Company and with every day the number of new contracts is increasing. The party of men who came here from Kansas City to secure contracts have left and two new solicitors have succeeded them. At a close estimate about 20 contracts are being received every week. The company will now attempt to work the residential portion of the city, and as the rates are low and the service unexcelled there is every indication that the company will have over 4,000 working telephones inside of one year. Very little trouble is experienced in the operation of the exchange and the receipts for the first quarter were so large that the directors expressed confidence for the future. Its growth promises to be phenomenal.

NEW TRIAL ASKED IN McDONALD CASE.

THE New York & Pennsylvania Telephone Company is making an effort to secure a new trial in the damage case brought against the company by Peter McDonald, of Elmira, N. Y. McDonald was severely injured about two years ago while employed by the company as lineman. While working on a pole a number of feet from the ground, the pole snapped off and threw McDonald to the ground with great force, injuring him badly. It was claimed by the company that the accident was the result of contributory negligence on the part of the plaintiff, because he did not properly test the pole before mounting it. The jury awarded him a verdict of $2,500.

TO UNDRESS AT THE TELEPHONE.

"IT'S appalling," said an elderly aunt, who was spending a week in town, "to see how they use the telephone nowadays. Only last night when there was a dinner party on, Mary, who was dressing, answered the telephone which is in her room. And it was one of the men calling her up to say that he had been detained down town and was dressing then as quickly as possible, but didn't want dinner to be kept waiting for him.

"There the two of them stood talking to one another just as if they were entirely dressed and had stopped for a little chat on the street! I tell you this generation is a little too much for me."

ELECTRICAL MEASUREMENTS—ARTICLE XV.

(*Continued from page 21.*)

tive reflecting galvanometer, measurements much smaller than 100th of an ohm can be made with reasonable accuracy, and with the addition of a powerful battery it is easy to make resistance measurements fully up to the rated capacity of the bridge, but it is very rare that the portable testing set is called upon for such extremes of work.

Theoretically these limits varying from 1-1000th of an ohm to 20,000,000 ohms can be measured by the model shown in Fig. 1, but practically this range exceeds the sensitiveness of the galvanometer, for it is impossible for this instrument to indicate the almost infinitesimal change in potential at its terminals when resistances of 1-1000 or 20,000,000 ohms are inserted in the bridge arms. Finally when it is desired to use the bridge throughout its full range, the D'Arsonval galvanometer illustrated in one of the previous papers can be used with excellent success. For resistance over a megohm a battery of about 100 volts is desirable. This may be obtained either by a number of dry cells or by connecting the testing set with a lighting circuit. When high battery powers are used it is necessary to exercise very great care in testing, or otherwise if the unknown resistance happens to be very much smaller than is supposed, the bridge and the galvanometer may be subjected to currents of such strength as to seriously injure them by melting the coils, burning the key contacts or rupturing the galvanometer suspensions. As the actual quantity of the current taken by the bridge is very small, it is well to put 1 or 2 lamps in series with the lighting circuit, or to guard the battery circuit by a fuse of very small carrying capacity, such as a bit of tin foil, or what is even more preferable, to insert in the battery circuit a heat coil of low-carrying capacity. By this precaution bridges may be used over the full range for which they are constructed.

TELEPHONE FLOOD DAMAGES.

By I. H. Green, *Special Correspondent.*

DURING the recent floods in the Mississippi Valley States, the telephone companies, both Independent and Bell, were heavy sufferers. The Independent Telephone Company of Topeka, Kan., especially, had a great deal of trouble. It had 125 telephones completely submerged in North Topeka. These telephones are now being replaced with new instruments.

The Topeka Independent Company is also adding three switchboard sections to its equipment in order to handle the large increase in the number of its subscribers. When completed, the capacity of the plant will be 2,000 telephones. The equipment was supplied by the American Electric Telephone Company. At present the Topeka Company employs 27 operators, and its service is very popular with the telephone using public. It employs 40 linemen.

In order to get apparatus for repairing the flood damage, the Independent Company was forced to have all deliveries made by express at great expense. Owing to the tie-up of nearly all railroad traffic, it was absolutely impossible to get the materials shipped in time by freight. All available linemen were put on the working force so as to get things in shape as rapidly as possible.

INDIANAPOLIS COMPANY REWARDS OPERATORS.

THE Independent Telephone Company of Indianapolis, Ind., has inaugurated a new method of securing rapid, efficient service from its operators. Three prizes aggregating $50 are given each quarter to the three operators who have made the best all around record for that quarter. The operators are graded on attendance, deportment, "lost" calls and message routing. A day's absence from work takes off a credit, there are certain rules of deportment, and each time a call is "lost" another mark is taken off. A call is said to be "lost" when the party called cannot be found or when the party making the call leaves the telephone before the called party answers.

The message routing grades are determined by examination. There are so many toll connections in Indiana and vicinity that it becomes an important matter for the operators to be able to locate a station called for at once without calling the chief operator and having the route laid out. To facilitate this work, the operators study the different routes at odd times in much the same way as the United States mail clerks study the railroad lines to get the quickest delivery of the mail.

The prizes are divided into $25 for first, $15 for second and $10 for third places. One of the quarterly examinations was recently held by the company at which the operators were tested as to their knowledge of the different routings.

A COOL ROOST.

By Wm. H. Elges, *Special Correspondent.*

B. H. CLEANER and J. C. Westfall, of Canton, Mo., had an experience at the time of the Mississippi River flood that they do not care to repeat. The gentlemen were going to the south of La Grange to repair the telephone line which runs near the river bank at that point. They stopped to do some work about three and a half miles south of La Grange on a line which was out of repair. The water in this section had risen until the pole was submerged to the depth of eight feet and the whole valley was flooded, consequently it was necessary to row out to the pole in a skiff. One of the men climbed the pole while the other remained in the skiff to hold it. In some unexplained way the man at the bottom let the skiff get away and was obliged to join the other man who was at the top of the pole, on the cross arm. This happened at five o'clock in the afternoon, and as no one came near they stayed in this position until 9:30 o'clock, when they were heard by a passer-by, who went to the town and brought assistance. To make matters worse, while they were clinging to the pole a fierce thunder shower blew up which thoroughly drenched the repairmen, who were without their coats. The rain was accompanied by a great deal of lightning, which did not add appreciably to the comfort of the situation.

INDEPENDENT TELEPHONES ON LONG ISLAND.

A TELEPHONE company has been organized by some of the farmers residing near Baiting Hollow, Long Island. The company was formed two years ago with a capital of $500. The stockholders cut and set the poles, strung the wire and installed the telephones themselves. Since then the demand for telephones has so increased, that last year the capital stock was raised to $5,000, and those in a position to know say that soon it will again be increased. Such a substantial dividend was paid last year that there is quite a demand for the stock, which has been subscribed for several times over. Telephone poles to the number of 1,500 have been bought which will be used in extending the lines from Mattituck to Greenport on the east, and from Riverhead across to the South Side west to Patchogue. The New York and New Jersey Company (Bell) are watching the little company's progress carefully and have already constructed a line paralleling one of the local company's which runs from Jamesport to Mattituck. This is the only farmer's line that the Bell company has so far constructed.

ANOTHER SIMULTANEOUS INSTALLATION.

By H. A. Lane, *Special Correspondent.*

THE new telephone system along the Wheeling & Lake Erie Railroad is practically completed. The establishment of the system did not require the putting up of another line, as the telegraph wires are used without interfering with the sending of telegraph messages. Verbal and tick messages go at the same time. The most valuable feature of the railroad telephone system is the aid that can be rendered in case of an accident to a train while out on the road between stations. All cabooses are equipped with a telephone box and a rod that connects it with the wires. The train can stop at any time and call the dispatcher or any office along the line. In case of accident no time is lost in notifying the proper officials and getting the wrecking crew at work. It is expected that the system will be introduced on several other lines in Pennsylvania and Ohio within a short time.

CUTTING A TELEPHONE EXCHANGE FROM MAGNETO TO COMMON BATTERY.

WE find that an error has been made in the name of the author of the above-mentioned article. Instead of the author's name being W. C. Boyer it is W. C. Boyrer.

The Editor's Page.

MATHEMATICS IN TELEPHONE ENGINEERING.

THERE is much that telephone engineers and instructors, and notably writers on telephony, may take to heart in the advice recently given to a graduating class of young men by an eminent civil engineer. The advice was contained in a lecture the engineer delivered, and was as follows:

> Beware of abstruse mathematical calculations, for these too often are based on false hypotheses and in consequence produce unreliable results. Mathematics should be treated as a servant and not worshipped as a god! Some men appear to think that a technical paper, to be of any account, should be filled with abstruse mathematical calculations, on the same principle which many old English writers adopted when they interlarded their writings with numerous Latin and Greek quotations, simply to show that they had received a polished education. This is all wrong, for the less mathematics a technical paper contains and the simpler the said mathematics, the better, in my opinion, is the paper. Now don't go off with the idea that I am not a believer in the higher mathematics and in the necessity for their study. Although as a rule the mathematics in an engineer's practice are of a very simple and elementary character, yet there occasionally occurs a problem which will set him to thinking and to brushing up on the mathematics of his school days.

In reading over this extract our mind immediately turns to a book supposedly written for the practicing telephone engineer, in which the deductions, although they are undoubtedly of the greatest value to the telephonist, are so encumbered with calculus that the average practical telephone engineer would be wholly lost, and would probably overlook the good points which are hidden in a maze of equations.

The science of mathematics is probably used less in telephony than in any other branch of engineering. When a man starts out to design an alternator calculations must be used at every turn. When a man starts out to design a telephone circuit or a switchboard he just keeps at it until he gets what he wants. The proposition is essentially one of cut and try.

Let us, then, make our telephone literature as simple as we can. While there are many men in the telephone field who can handle involved equations along with the best, there are many more practicing telephone engineers who can't.

SOCIETY FOR PREVENTION OF CRUELTY TO TELEPHONE SUBSCRIBERS.

WE read that the committee that was formed last November to organize a protest against the transfer of the Tunbridge Wells, England, municipal telephone system to the National Telephone Company has just been disbanded. Why the committee took so long to disband itself it is a little difficult to see, but events no doubt move slowly in Tunbridge Wells, which might be called the Old Point Comfort of England—though there is not the slightest resemblance between the two places. A further note on the subject throws a little more light on British municipal telephone methods and gives some indication of the reasons for the hopeless failure of municipal telephony. It is proposed to organize a "telephone users' protection association," and the reason why a body with such a pretty name is wanted is this: While the municipality worked the telephones no contract beyond a written request to be connected with the system was required. The subscribers now refuse to sign contracts, or at least some of them do, and they want a society for the Prevention of Cruelty to Telephone Subscribers to protect them. The fact that the municipality neglected to put its telephone business on contracts, shows the laxness of municipal business methods. As we have ventured to suggest before the British public will never get any sound development of telephony by means of municipal competition. Telephony is too progressive a business for municipalities to tackle. Let them give companies a free hand and Great Britain will soon have a few telephone systems worth talking about. And they will be equipped with American apparatus and give a real telephone service.

THE NEW ENGLAND BELL BACKS DOWN.

THE Bell people are getting farther and farther away from their old-time habit of haughtily ignoring that there is such a thing as Independent competition. At one time it seemed as if such little facts as the collapse of three of the largest licensed companies, and the consequent winnowing out of millions of dollars' worth of securities, through Independent rivalry, brought no light to Boston. The same old stupid methods were adhered to, but lately there have been some evidences of an awakening to the fact that there are now over half a million more Independent instruments in operation than there are Bell. One of the latest manifestations of the new order comes from Maine. Some time ago the New England Telephone and Telegraph Company (Bell) gave formal notice that its rates in the towns of Rockport and Camden would be raised on July 1. When the announcement was made prominent men from the towns began looking into the question of organizing an Independent company. A telephone committee was appointed which went at the proposition in a business-like way and invited L. A. Gondy, vice-president; E. W. Gearhart, treasurer, and John B. Pierce, engineer, of the Northeastern Telephone Company, to visit the section and look over the ground with a view to establishing a telephone exchange. This looked so very much like business that on the day when the committee was to meet the Northeastern Company's representatives, Mr. Story, who is special agent for the Bell, telephoned the following letter:

> Mr. Shepherd, Chairman of the Telephone Committee, Rockport, Me.
>
> Dear Sir: Referring to my letter of May 29, fixing a date for making certain changes in rates for telephone exchange service and in charges for toll service, I beg to say that conferences with your Committee of Conference have so occupied the time that we have not yet found the opportunity for taking up with our subscribers the matter of rates on classes of service. As supplementing conference with your committee, which I feel has been of great value, giving opportunity for free exchange of views and establishing relations of confidence, I propose to take up with our subscribers both large and small users of the telephone the fixing of satisfactory terms of service and feel that the change in rates as announced for July 1 should not go into effect while the company is dealing with its subscribers and customers.
>
> I therefore beg to advise you that till further notice no change will be made in service rates and charges as they now exist if your committee defers further action in the matter.
>
> Yours,
>
> F. W. STORY, Special Agent.

Between the lines may be read, if you don't go ahead with your telephone company we won't raise the rates. The committee will continue its investigation.

WHO WOULD HAVE THOUGHT IT.

IT is somewhat surprising to read about that eighty tramway—meaning electric railway—systems in England are equipped with telephone systems. In the first place, one would hardly have believed that there were eighty electric railway systems in England, much less eighty electric railway systems so up to date as to be equipped with telephone stations along the line. We shall pretty soon have to be revising our opinions on electrical progress in England. One electric supply company, the General Electric Company, makes a special feature of these tramway telephone systems, and provides a complete outfit of a very substantial nature. The post fitted along the line is a short iron column of neat and graceful design, surmounted by a weatherproof iron box—the door opening with a special key—containing the telephone and calling apparatus. A special switchboard of a very substantial nature is supplied for use at the central station, all the parts, drops and jacks being fitted so as to be readily removable, and all are interchangeable, so that any defective unit may promptly be replaced. At termini or important points a mammoth magneto "extension bell" is placed on a pole or on the wall of the building, so that the attention of the switchman or foreman may be attracted without fail.

CONTEMPORARY CROSS TALK

By "The Listening Key."

WHILE all the talk which the esteemed Mr. Aitken has precipitated concerning the divided multiple switchboard is going the rounds, it will perhaps be of passing interest to some to review briefly a few of the methods of operating other than the regular magneto system under which the subscriber does part of the work. One of these methods, long a favorite in certain parts of the country, was to make the subscriber work his way through with a trunk call. You are connected to Main and you want 347 East. When Main answers you, you say "347 East." You hear some rumblings and clicks and eventually another operator comes in and says fuzzily, "Here, East," or just "East." Then you have to say over again, "347 East," or just "347." If you are thoroughly drilled in this way of working, all right; if not, you find it a trifle irritating. You are kept occupied, but it makes you mad just the same. Now, an expert operator, properly equipped, can pass the call much quicker than you can, and certainly much quicker than you do on the average. For not every call that has to be repeated by the subscriber goes through without delay; the repetition often has an irritating effect, and irritation is generally productive of friction. For my part, when I go into a store and state a request specifically and the young man goes off and sends another different young man to whom I have to state things all over again, I want to throw things at both young men; and I imagine neither the experience nor the resentment of it is peculiar to me. The same with this working one's way through on a trunk call. The repetition is annoying, and must often provoke resentment, argument and delay. Clearly, the work can be more quickly and economically done by the expert operator. The important point is that unnecessary delay in handling calls means wasteful use of the plant, and that point the advocates of the work-your-way-through system have quite failed to appreciate.

Ring Through System Wasteful

THEN take the "ring-through" system. The "ring-through" system, carried to its logical conclusion, means either a special clearing-out signal or a special signal for both calling and clearing-out. In the "ring-through" system the whole work of ringing the called subscriber is thrown on the calling subscriber, which means that the subscriber's generator must either actuate no signal at the exchange or that the signal which it actuates must be used only for a line signal, and that a special signal, operated in a special way must be provided for a disconnection signal. The system is worked in both ways. In one variety a push button actuates the line signal, and the same button actuates the disconnection signal. In another variety the line signal is actuated by the subscriber's generator and the disconnection signal by a special button. Either way it is a wasteful and old-fashioned system of telephone operating. The subscriber, having been told that he is connected, has to replace his telephone on the hook or otherwise hold the hook down and ring his correspondent—an awkward and tiresome operation, which tends to become exasperating to a busy man. Now, a "ring-through" system generally means a "ring-back" system. The subscriber gets in the habit of ringing, and he very often answers a ring by a ring. This leads to another delay, because subscribers who object to being rung in the ear leave their telephone on the hook until they get the answering ring. This habit perverts even those who have sufficient native common sense not to ring back unless driven to it. When they find nobody on the wire they naturally ring in order to raise some one, and so in time a "ring-through" system becomes a general "ring-back" system also, and you have thousands of people going through the idiotic performance, thousands of times daily, of ringing to and fro at each other for many unnecessary hours of precious time.

Call Wire System Still Worse

THE call-wire system, which is the system *par excellence* where the subscriber does the work and endures all the fret and worry of his own and his neighbor's, and the operator's mistakes and delays, combines all the disadvantages of the "ring-through" system with a catalogue of disadvantages peculiar to itself. The call-wire system is a "ring-through system without any signals at all. The subscriber speaks his orders over a special call-wire to the operator, and having no connection, he rings through as before. When the conversation is finished, the subscriber has again to get the attention of the operator over the special service wire and order the connection down. In the ordinary "ring-through" system, or in the old magneto system, both subscribers can give the clearing-out signal, but in the call-wire system only the originating subscriber can do so—except in the rare cases where the two subscribers happen to be on the same call wire. We know well that when the disconnection signal is non-automatic many subscribers forget or neglect to give it, and that even when both *can* give it many "hang-ups" occur through both not giving it. Imagine what happens when only one can give it and when to give a disconnection order requires the subscriber to go in on the call wire again and get the attention of the operator when perhaps half a dozen others are showering orders on her at the same time!

Efficiency of Relay System

COMPARE all these methods of operating, where part of the work is thrown on the subscriber, with the relay system, where the work of the subscriber is reduced to the two necessary actions of taking down and replacing the telephone, and the difference is as from darkness to light. The service can be used by anyone without practice, precaution or special instructions. The service is far quicker than can be given by any other system; it is accurate, and it is carried on with the minimum waste of time of the plant as a whole and of the subscriber's line individually. The results are so immeasurably superior that all arguments in favor of making the subscriber do part of the work are swept away as crude theories of a by-gone age. With the relay system, all we ask of the subscriber is to be alert and business-like, to answer the bell quickly, to be sure that he asks for the number he really wants and to speak his orders distinctly. All the real work of operating we put where it most properly and logically belongs—in the hands of the expert operator. Having put it there, "it is up to us," to use the expressive phraseology of the day, to see that the operator *is* expert.

THE SPEAKING ARC.

IN these columns various accounts have been given of the highly interesting experiments made with the speaking arc, which have resulted in a form of "wireless telephony" that may very probably be brought to the point of practical application in certain exceptional situations, where expense is no object. The latest experiments with arc-light telephony were carried out in Germany, and now two Russian investigators have found that an ordinary flame can be made to talk. These two gentlemen, rejoicing in the names of Gabritschewski and Batschinski (it is to be hoped they made the flames say their own names), experimented with flames of various kinds, such as those produced by a Bunsen burner, a kerosene lamp and a candle, and made each one of them speak. From the two terminals of the secondary of an induction coil short leads were taken to insulated Bunsen burners, kerosene lamps, or to short candle ends. A battery and transmitter, capable of taking currents up to four amperes, were connected to the primary of the induction coil. A distance of about thirty yards separated the transmitter from the flame. In the experiments each of the flames gave an excellent rendering of singing, whistling and even speech. In these experiments it will be noticed that the flame is the receiver, not the transmitter or translator, as in the Ruhmer experiments. The essential conditions for success are to have sufficiently great changes of potential at the flame electrodes. Two flames, one connected to each terminal of the induction coil and the two connected together by a third wire, make an arrangement that gives the loudest results.

The Telephone in the Courts

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

IMPROVING SERVICE CAUSES LEGAL COMPLICATIONS.

THE Central New York Telephone & Telegraph Company is having a discussion with the city of Syracuse over an attempt by the company to improve its service and charge higher rates therefor. The company decided to discontinue its grounded circuit service with Blake transmitters and use long distance telephones, with metallic circuits in all cases. The company undertook to insist upon the change with all subscribers whose telephones were on grounded circuits. Some of the company's subscribers appealed to the Common Council of the city, which under the advice of the corporation counsel took the position that the company had violated its subway franchise of 1897, providing that the company should not increase the rates then current for telephone service. The council contended that the forcing of a subscriber to give up the grounded for the metallic service amounted to an increase of rates, inasmuch as the charge for the latter is greater than for the former. The charge for grounded service with a telephone for individual business use is $48 a year, while for the long distance instrument with metallic service for similar use the charge is $80 a year.

The company announced that, although it had the right to discontinue the grounded circuits and to substitute the metallic circuits at a higher price, it would concede a point and allow subscribers to take their choice of service at the different rates for each, the company yielding none of its legal rights and reserving the right to discontinue the grounded circuits at the lower price whenever it sees fit to do so. It thought that so few of its subscribers would take the old service as to make its continuance comparatively harmless, but said that if there should be a sufficient increase in the number of subscribers having the grounded circuit service to result in the impairment of its entire system, it would withdraw its offer and appeal to the courts to protect its rights.

DUTY TO FURNISH TOOLS CANNOT BE DELEGATED TO A FELLOW SERVANT.

THE Supreme Court of North Carolina has passed a second time on the case of Orr vs. Southern Bell Telephone and Telegraph Company. The telephone company obtained a verdict of non-suit which was reversed by the Supreme Court. A new trial in the Superior Court was then had and this time plaintiff recovered a judgment which the Supreme Court has just affirmed. In this second appeal the court enunciated the following principle that is of great importance to telephone companies: "The master's duty to furnish the servant with proper tools cannot be delegated to a fellow servant so as to relieve the master from liability for injuries resulting from failure to furnish such tools."

The facts in the case were that plaintiff had gone to work for the first time for the defendant under a foreman named Wood and was told to go with a gang of men into the country to take down a telephone pole. Before starting the foreman told the hands to put the necessary tools into the wagon. When they reached their destination they were put under a new foreman. When ready to commence work they found they had neither "pikes" nor "dead men" to use, but under the foreman's instructions they went to work, using shovels in place of "pikes." As a result the pole fell and injured the plaintiff. The court said that the failure to take the necessary tools was not such contributory negligence as to bar plaintiff's right of recovery because the order was not addressed to the plaintiff individually, but to all hands collectively. The fact of his attempting to do the work without such tools was not an assumption of the resulting risk, because the danger was not sufficiently obvious. It would only be held obvious to that extent if the probabilities of danger were greater than those of safety. The master's failure to furnish tools was a continuing negligence and in such case there can be no contributory negligence that will discharge the master's liability.

Orr vs. Southern Bell Telephone and Telegraph Company, 44 S. E. 401.

ENJOINED FROM PROCEEDING WITHOUT FRANCHISE.

IN a case pending before the district court of Sedgwick County, Kansas, the city of Wichita is seeking to permanently enjoin the Missouri & Kansas Telephone Company from stringing wires, setting poles or doing other construction work in the city. The city contends that the company's franchise has expired, and the company has refused to accept a franchise offered them by the city. The company's position is that it is a telegraph company, and under both State and Federal laws is given the right to use the highways of the country for their lines. It therefore believes that the city has no right to interfere with its building of lines within its boundaries. The case has been argued, but no decision has yet been reached.

Another injunction case, involving the very same question, but with the position of the city reversed, is pending in the United States Circuit Court. The Old Colony Trust Company and Charles J. Hubbard are the complainants, and ask that the city of Wichita and its employees be restrained from interfering with the Telephone Company's plant. The complainants are creditors of the telephone company, and allege that any interference with the plant by the city would weaken the security of the bonds that the trust company, as trustee, issued on the plant and sold to investors. The decisions in both cases are being watched with interest, and there is much speculation as to whether the courts will both decide the questions involved in the same way.

TELEPHONE COMPANY DISTURBED BY LABOR TROUBLES.

LABOR troubles are disturbing the Central Union Telephone Company, of Rock Island, Ill. Last fall, after a strike of the company's operators, the city council revoked its franchise, and since that time the company has been operating without a franchise. No question had been raised by the city or by anyone concerned. The linemen of the company have had a dispute with it over the employment of non-union labor, and at the last labor congress brought up the franchise question. The congress permitted its business agent to be delegated to appear before the city council and ask why the company was allowed to operate without a franchise. No action has yet been taken by the council

FOREIGN CURRENTS

By *"The Arrester."*

MUNICIPAL telephony continues to occupy a good deal of attention in British telephone and municipal circles. Mr. Bennett writes to all the papers saying his is the biggest system, carries "the bulk of the traffic" and is, moreover, progressing by "leaps and bounds." This latter performance on the part of a telephone system must keep the inhabitants of Glasgow in a rather perturbed state of mind. The National Company's point of view is the familiar one that it is not much to the public advantage that the majority of subscribers should be obliged to have two telephones instead of only one. "Who makes two blades of grass to grow where only one grew before" ceases to be a benefactor of mankind, thinks the National, when it is a question of telephones. Meanwhile Belfast, Ireland, and Cambridge, England, are flirting with municipal telephony, while Hull, as already recorded, has accepted tenders for its municipal telephone equipment. There is considerable opposition to the Hull scheme among local bodies, as the municipal telephone business in England has been so badly managed, both technically and financially, that a good deal of distrust has been aroused as to the efficacy of this method of telephone competition. There is to be an enquiry, before the loan of some $200,000 to provide the capital for the telephone system is authorized, and the opposition will make itself heard at this enquiry. No doubt Hull will be fully enlightened on the telephone question within the next month or so.

A Lecture on Telephony

A SERIES of public lectures on technical subjects is being given at Caxton Hall, Westminster, the district of London inhabited mostly by engineers. The subject of the latest lecture of the series was "Telephony," and it was delivered by Mr. F. C. Raphael, the editor of the London *Electrician*. Mr. Raphael has evidently made a special study of telephony; quite an unusual thing for the editor of a British electrical journal to do. Mr. Raphael traced briefly the early history of the telephone in Great Britain, showing that the telephone was quickly taken up there, as in 1879, only three years after the invention of the telephone, there were exchanges established in London, Liverpool, Manchester and Glasgow. At the present time there were more than 1,100 exchanges in Great Britain, serving over 250,000 subscribers. In London there were 65,000 subscribers of whom 55,000 were on the National system and 10,000 on the new Post Office system, the two systems having free intercommunication. Mr. Raphael went into the thorny question of the higher cost of service in a large city as compared with a smaller place, and illustrated some of the differences between large cities themselves by showing curves of the daily telephone traffic in London and New York. New York apparently has longer business hours than London and spends less time over luncheon, resulting in a broader and less peaky load curve.

Useful Telephone Facilities

THE lecturer then described the working of a modern common battery exchange, using as an illustration the new Post Office main exchange, serving 7,560 subscribers and having an ultimate capacity of 14,000. This part of the lecture was illustrated by lantern slides and a working model. After briefly describing the organization of a telephone staff and the construction of the overhead and underground line plant, Mr. Raphael explained how subscribers could utilize their telephones for a number of purposes, the very existence of these facilities being ignored by the majority of the public; for example, telephoning telegrams, express (special delivery) letters, and even ordinary letters to the Post Offices for forwarding or delivery, thus effecting a large saving of time in sending important messages to non-subscribers. Messages may be telephoned to a Post Office for transmission as ordinary letters for a charge of 2 cents for 30 words, in addition to the regulation 2 cents postage, and telephoned express letters are delivered at the ordinary express fee of 6 cents a mile without extra charge for taking down the message. The lecturer concluded by expressing his disbelief in automatic switchboards and with a reference to the telegraphone, regretting that that beautiful invention had not yet been developed to form a useful auxiliary to the telephone exchange system. The audience, which we regret to note was "meagre," was thoroughly interested and certainly got its money's worth; further, its members must have gone out better telephone users than they went in.

"Lightning's Comments"

OUR lively contemporary *Lightning* has some characteristic comments on this lecture, as follows: "It is not possible within an hour and twenty minutes on a hot afternoon to make clear to an audience that knows nothing about it the problems and possibilities of a telephone system for London. To give a general idea and show some pictures is about all that can be done, and that is about what Mr. Raphael did. On the programme he was to discuss the merits and demerits of the present services. Instead of one of the worst, he says, London has one of the best telephone systems. Telephonically we are more advanced than the continent of Europe, where the telephone, being a Government institution, has made little headway. An exception is Scandinavia, and the progress there the lecturer put down to the 'peculiar intonation' of the Scandinavian languages and the 'excellent telephonic temper' of the Scandinavian peoples. Whether Mr. Raphael was serious or joking I will not pretend to say; the audience, at any rate, depressed by the heat and semi-darkness of the room, which made it impossible to see anything, took it quite seriously. Also in Germany and on the Continent generally the military training of the people helped to make the telephone work smoothly.

How About U. S. ?

THE American intonation is not quite that of Scandinavia, nor are the Americans a militarised nation with a special aptitude for obeying regulations. The lecturer, however, passed over America, and the enormous telephonic development there, very lightly. As it is, our Independent telephone friends of the Middle and Western States, with their 5,000 exchanges and more subscribers on them than the Bell companies can show, will hear with surprise from the editor of the *Electrician* that in nine cases out of ten they have been, or are manifestly destined to be, absorbed by the older organization with which they set out to compete. "The truth is, of course, that the Bell organization, firmly intrenched in the large cities and in possession of the long distance lines, holds a strategical position from which nothing can ever drive them. Unfettered competition has resulted in popularizing the telephone in a marvelous manner in the country districts of America among a class of people that in Europe or Great Britain never think of using it."

Our Own Comments

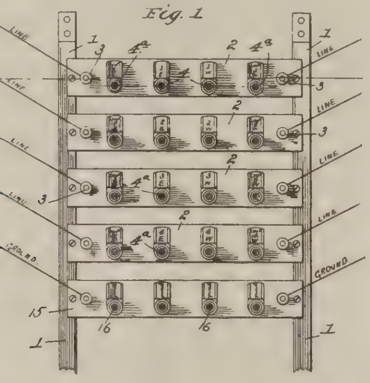
WHICH remarks go to show that *Lightning* is an attentive reader of the AMERICAN TELEPHONE JOURNAL, and notes the signs of the telephone times in this country. This is far more than can be said of those European telephonists or writers on telephony who are heard at all in the press. The telephone has been developed in the United States in every way far better than it has anywhere in Europe. Technically the American telephone industry is greatly more advanced, the grade of service supplied is infinitely superior and the general standard of work is higher; the business management is more progressive and alert, and the financial policy is on sounder and more enterprising lines. Consequently we have the enormous telephonic development that *Lightning* appreciatively notes. Yet European telephone men as a rule absolutely ignore our progress and the reasons for it. With few exceptions they hardly seem to know the meaning of good service, or to appreciate the revolution in technical methods that has lately taken place, or, in short, to have absorbed any knowledge of the high standards of business and operating efficiency that we have set up on this side of the Atlantic. Perhaps it will be necessary to spread the true faith in Europe for the AMERICAN TELEPHONE JOURNAL to publish a European edition.

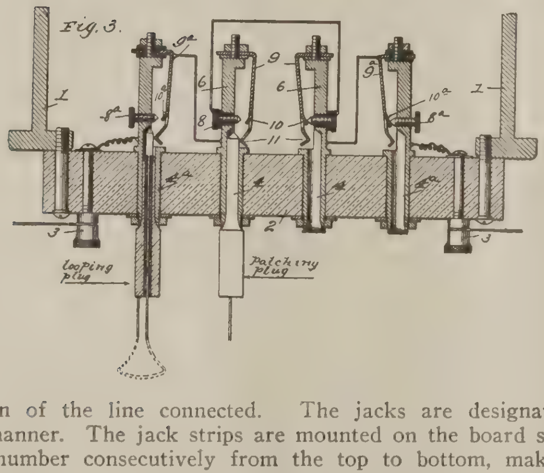
PATENTS ISSUED

PAY STATION APPARATUS.

John F. Shirrow, of East Orange, N. J., patents (No. 732,012) a switchboard, and assigns one-half to Charles Shirley, of Brooklyn, N. Y. The object of the invention is to provide a switchboard which may be manipulated by an unskilled operator with small liability of error.

Fig. 1 shows a front view of the switchboard and Fig. 3 a horizontal section showing a looping plug and a patching plug in their respective jacks. The lines are terminated on the binding posts 3, mounted at the ends of the jack strips, as in Fig. 1. One jack strip consists of two looping and two patching jacks. One jack strip is provided for each line. The jack strips are made of insulating material. The circuit from the binding post 3, where the line enters the board, is normally closed through the jacks to the binding post 3. The wires connected to the terminals are given distinguishing letters such as 1E, 1W, to specify the portion of the line connected. The jacks are designated in like manner. The jack strips are mounted on the board so that they number consecutively from the top to bottom, making it an easy matter to locate any desired line. The contact point 8, in the patching jack, is insulated from the body of the jack, as is the contact plate 9*a* in the looping jack. A grounding bar 15, provided with jacks, is secured to some convenient point on the supports.

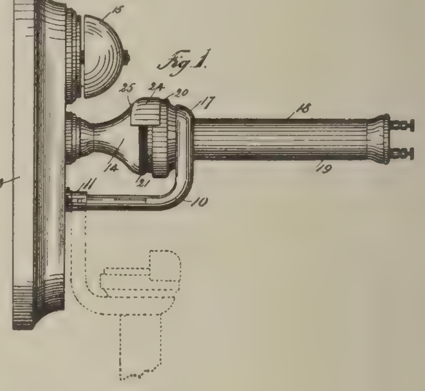




To connect any wire on the switchboard with any other wire one of a pair of patching plugs is inserted in the jacks of the lines to be connected. To loop in on any wire it is necessary to insert a looping plug in the looping jack of the desired line. The operation of grounding a line consists in placing one of a pair of patching plugs in the patching jack of the desired line, the other plug of the pair being inserted in a grounding jack. The insertion of a patching plug in the patching jack of any line serves to open the wire, as will be seen from Fig. 3.

REPEATING DEVICE.

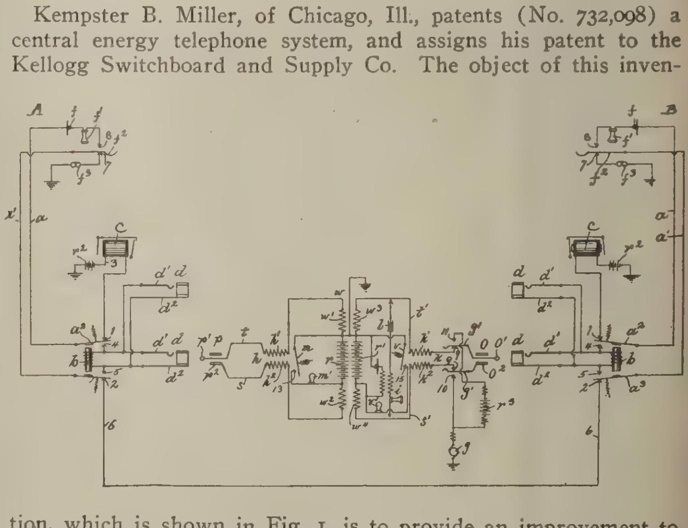
James Robert Troland, of New York, N. Y., patents (No. 731,822) an apparatus for telephoning. The object of this invention, which is shown in Fig. 1, is to provide means for connecting two telephone lines in communicating relation without making an electrical connection between them. The invention is intended to be applied to an intercommunicating hotel or house system when the stations terminate in a local exchange. The receiver connected to the outside line is attached to the operator's transmitter of the local system as in Fig. 1. Any vibrations of the receiver diaphragm due to alternating talking currents on the line will be transmitted to the local system by means of the operator's transmitter through the medium of the air between the transmitter and receiver. The air vibrates in unison with the receiver diaphragm and transmits these vibrations to the transmitter diaphragm.



The transmitter is provided with a rubber ring, 21, and the receiver with a flange fitting into the ring, thus making an air-tight joint. To secure the receiver more firmly, it is provided with a lip, 24, which fits over the transmitter as shown. When not in use the receiver, together with the arm 10, may be lowered into the position shown by the dotted lines.

CENTRAL ENERGY SYSTEM.

Kempster B. Miller, of Chicago, Ill., patents (No. 732,098) a central energy telephone system, and assigns his patent to the Kellogg Switchboard and Supply Co. The object of this invention, which is shown in Fig. 1, is to provide an improvement to the telephone system, patented by Francis W. Dunbar (No. 12,031), the improvement consisting of the method by which the line relay of the subscribers' line connected to the central office by means of the calling plug is held in operative condition during the depression of the ringing key. From an inspection of Fig. 1, it will be seen that when the calling plug is inserted in the jack of line *B*, and the ringing key depressed, that the current from the battery r^1, which normally operates the line relay *b*, is cut off



and that if some means were not taken to keep the relay *b* in operative condition, the line to station *B* would be open at contacts 4 and 5, and signalling would be impossible.

The desired result is obtained by connecting the supplementary battery r^3 to the ringing key, as shown, current from this battery serving to operate the relay. The cord circuit and sub-station wiring, shown in the diagram, is of the well known Kellogg system.

TELEPHONE HOOK SWITCH.

Ernest B. Fahnestock, of New York, N. Y., patents (No. 732,287) a telephone-hook switch. This switch consists of a number of spring plates mounted on a bracket *B*, secured to the back of the instrument. The portion of the switch which carries the receiver is also mounted on this bracket. The switch springs are arranged, as shown in Fig. 2, so that when the receiver is on the hook the circuit is closed from the line *S*, through the condenser springs *F* and *G*, through the bell and back to the line *T*, thus keeping the bell in circuit. The removal of the receiver from the hook brings the springs *I*, *D* and *C* into contact and closes the talking circuit, at the same time cutting out the bell. Fig. 1 shows the switch applied to an instrument and Fig. 2 shows the arrangement of the circuit.

FIG. 1.

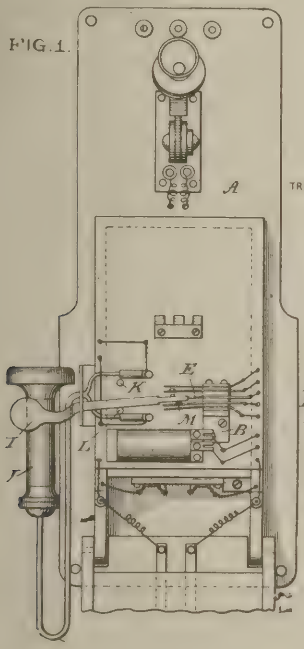
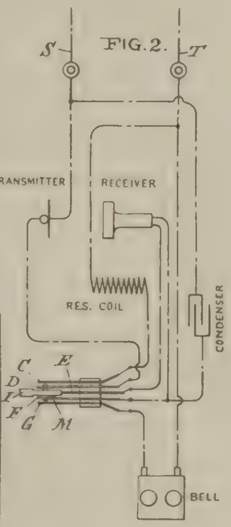


FIG. 2.



TRANSMITTER BASE.

Ernest B. Fahnestock, of New York, N. Y., patents (No. 732,286) a telephone transmitter base. Fig. 1 shows a front elevation of the base, and Fig. 3 a section on line 3—3.

The base consists of two projecting arms A_1 *A* of spring material and a body portion *B*, cast around the bottom of the arms, as shown in Fig. 3. The transmitter holder is fastened to the base by means of a pivot through the holes in the arms *A*, *A*. Fig. 2 shows a side elevation of the base.

Fig. 1

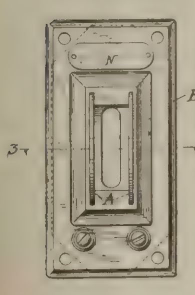


Fig. 2.

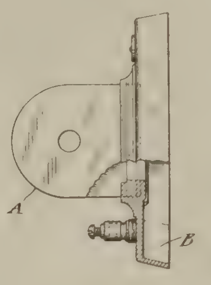
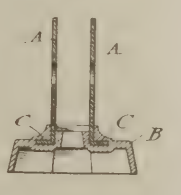


Fig. 3.



TELEPHONE SYSTEM.

Hiram D. Currier, of Ottawa, Ohio, patents (No. 731,106) a telephone system and assigns one-half to Jacob M. Lorenz, of Chicago, Ill. The object of the invention is to provide an improvement in common battery central office systems. The connecting circuit for two lines is shown in Fig. 2, which also shows the resistance of the repeating coils employed. Coils 7 and 8 are arranged in inductive relation with coils 3, 4, 5 and 6, as shown in Fig. 1. The operation of the system is as follows: Current flows from the battery through coils 3, 4, 5 and 6 to the subscriber's station and back. Conversation is repeated to the stations connected together through the coils 7 and 8, which are in inductive relation to the line coils, as above described. Coils 7 and 8 having a larger number of ampere turns than the line coils serve to raise the electromotive force on the line. The high impedance of coils 7 and 8 prevents them from interfering with the current on the line.

Fig. 1

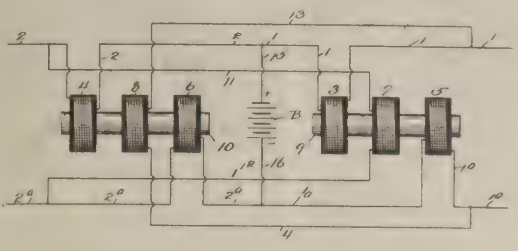
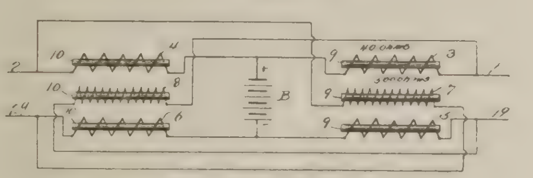


Fig. 2



TELEPHONE TRANSMITTER.

Ernest B. Fahnestock, of New York, N. Y., patents (No. 732,285) a telephone transmitter. The object of this invention is to produce a casing for a microphone transmitter, in which the packing of the carbon granules, due to the vertical position of the microphone, is avoided.

Fig. 2 shows a cross section of the transmitter, and Fig. 3 a side elevation, partly in section.

The sound receiving chamber 8, containing the microphone 9, has a rectangular cross-section and the microphone casing is made approximately square in order that it may be reversed or altered in its position, by withdrawing it from and reinserting it in the sound receiving chamber. The microphone is held in position by means of the set screw 25, with the faces of the electrodes of the diaphragms inclined at an oblique angle to the horizon. The granular material between the electrodes is thus to a large extent supported by the lower electrode, friction tending to prevent its packing in the lower portion of the microphone. An occasional reversal of the microphone in the transmitter will serve to counteract any tendency to packing that may exist.

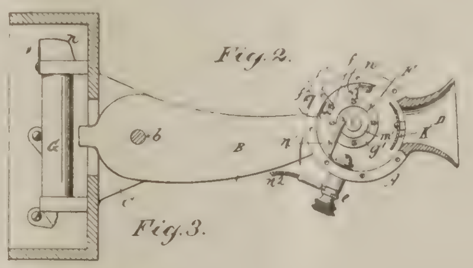
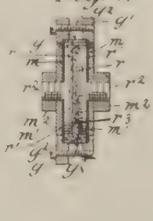
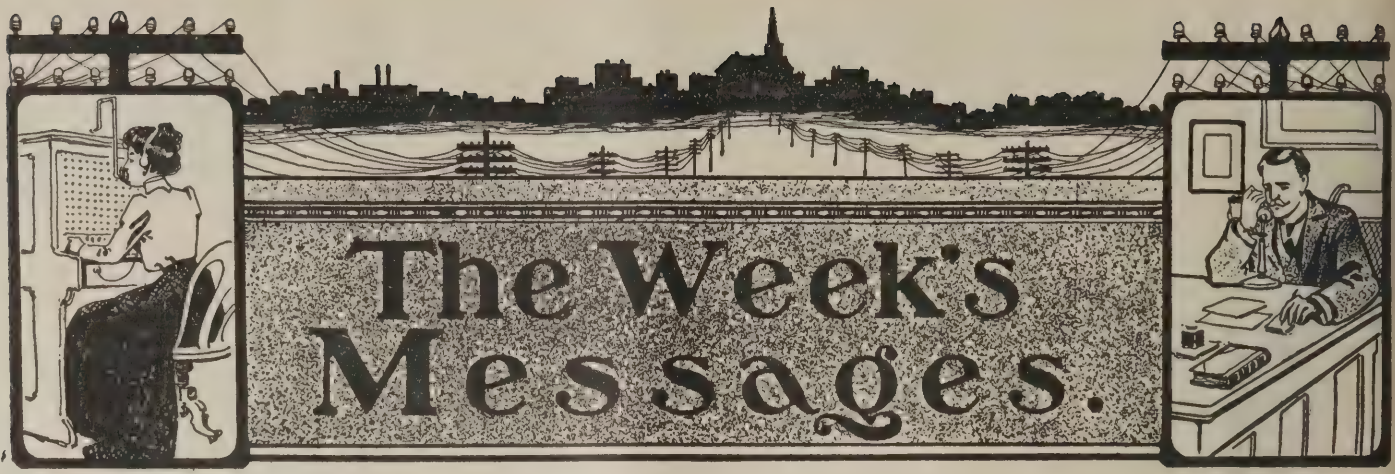


Fig. 4.





The Week's Messages.

FINANCIAL

LONG BEACH, CAL.—The Long Beach Home Telephone & Telegraph Company has filed its certificate of bonded indebtedness in the sum of $50,000.

FRENCH LICK, IND.—The French Lick, Elon & Eckerty Telephone Company has increased its stock from $930 to $1,420.

LOGANSPORT, IND.—The Logansport Home Telephone Company, of which Walter J. Uhl is secretary, has filed notice that it has increased its capital stock from $150,000 to $350,000.

LYNN, IND.—The Lynn Local Telephone Company has increased its capital stock from $8,000 to $15,000.

WINCHESTER, IND.—The Winchester Telephone Company filed a notice by its president, Alonzo V. Nichols, and its secretary, J. A. Brown, that it has increased its capital stock from $25,000 to $50,000.

ALMA, MICH.—At the annual meeting of the directors of the Union Telephone Company the semi-annual dividend of 4 per cent. was declared on all stock of issue.

MONROE, NEB.—The Monroe Independent Telephone Company has increased its capital stock to $10,000.

YORK, NEB.—The stockholders of the York Independent Telephone Company have increased the capital stock of the company from $50,000 to $500,000, this increase to be used in building and extending the telephone line in this county and enlarging and completing the capacity of the York central plant.

CLEVELAND, O.—The semi-annual interest on the bonds of Cuyahoga and United States Telephone companies were paid July 1.

WOODSFIELD, O.—The Woodsfield Telephone Company has increased its capital stock from $10,000 to $15,000.

TUNKHANNOCK, PA.—The Tunkhannock & Wyoming Telephone Company has increased its capital stock from $2,000 to $30,000.

WASHINGTON, PA.—The Federal Telephone Company has increased its capital stock from $10,000 to $2,500,000.

MERRILL, WIS.—The Merrill Telephone Company has increased its stock from $10,000 to $25,000.

FRANCHISES

GENESEE, IDAHO.—The council has granted to F. A. Pieplow, of La Junta, Colo., a 25-year franchise for electric light, power and telephone purposes. It is his intention to establish and maintain farmers' telephone lines and possibly also a city telephone system.

CHICAGO, ILL.—The Hyde Park Telephone Company's franchise giving access to the entire city has been recommended by committee for passage.

DES MOINES, IA.—The city council has repealed the ordinance granted the Mutual Telephone Company, of that city. Under that ordinance the company paid the city a small percentage of its gross earnings. It satisfied the council that if that payment must still be made it would have to go out of business.

SHELBYVILLE, KY.—The Home Telephone Company is making an effort to get the board of council to order the sale of another telephone franchise.

SEARSMONT, ME.—At a special meeting permission was granted Dr. A. Millett, I. S. Bartlett and others to set telephone poles to the Appleton town line and to the Montville line by the way of South Montville.

CINCINNATI, O.—The Fitzsimmons Telephone Company has made a formal request for council to pass an ordinance granting the right to string wires and lay conduits in the streets of the city.

CINCINNATI, O.—Powel Crosley, representing the Cincinnati Telephone Company, appeared before Judge McNeill to secure a decree, imposing the conditions under which Independent companies may enter Cincinnati.

COLUMBUS GROVE, O.—The village council has granted a franchise to the Mutual Telephone Company, made up of farmers.

FINDLAY, O.—The Farmers' Mutual Telephone Company, of Benton Ridge, it is thought, will be able to present its proposition to the local officials for a franchise some time this fall to enter this city. It is intended first to construct a line to the limits of the city.

MIDDLETOWN, O.—A franchise has been granted the Oxford Telephone Company for the erection of a telephone system on various county highways.

NASHVILLE, TENN.—A bill has been introduced into the city council providing for submitting to the voters of the city the question of granting a franchise to Harvey Anderson and associates for the construction and operation of a telephone system in Nashville. The life of the proposed franchise is thirty-five years. The ordinance provides that the wires shall be put into conduits if the city so orders at any time after a conduit system is established. Charges are fixed at $48 per annum for business telephones and $30 per annum for residences, and in lieu of all save ad valorem taxes the company is to furnish the city with thirty telephones; if more are wanted, regular rates are to be charged. At the end of twenty-five years the city, on twelve months' notice, may purchase the system at a valuation to be fixed by arbitration, the value of the franchise not to be figured in. The election is fixed in the ordinance for October 6.

MONTPELIER, VT.—The city council has reconsidered its vote refusing permission to the Orange County Telephone Company to enter the city, and has allowed it to set poles at the junction of the roads at the top of Clay Hill, thus connecting the East Montpelier and Sodon lines.

UNDERGROUND

BLOOMFIELD, IND.—Joe Moss, president; Otto F. Herold, secretary, of this city; Ziba P. East, of Worthington; C. C. Ballard, of Bloomfield; N. G. Nixon, M. F. McIntosh, of Newberry; John Davidson, of Lyons; J. F. Hodges, of Worthington; Peter M. Stone, of Scotland, and Hon. Peter Schloot, directors of the New Home Telephone Company, visited Linton recently and decided to install an underground system at a cost of $15,000.

KOKOMO, IND.—The Citizens' Telephone Company is planning to put its wires through the business quarter of Kokomo underground at a cost of about $40,000. The demand for telephones is so great that an increase in capacity is a necessity, and the company figures that in making the change the wires may as well go under ground and the plant made thoroughly up to date in every particular. The conduits will be built to accommodate wires for 5,000 telephones, and the exchange is now being increased to that capacity.

ST. LOUIS, MO.—The National Subway Company has asked for a franchise to construct an underground system of conduits.

HOBOKEN, N. J.—An ordinance has been introduced in the common council to compel all electric and telegraph companies to put their wires underground. The passage of the ordinance would affect the Western Union Telegraph Company, the Postal Telegraph Company, the New York & New Jersey Telephone Company, and the United Electric Company.

ELECTIONS

MARION, IND.—The promoters of the stock company merging the electric light and telephone plants met and chose the following board of directors: O. P. Litzenberger, J. A. Kenny, B. F. Agness, O. L. Barger, O. H. Trook, J. J. Sumpter and L. T. Barger. The following officers were then elected: O. P. Litzenberger, president; J. A. Kenny, vice-president; B. F. Agness, treasurer, and O. L. Barger, secretary.

BUSSEY, IA.—The Bussey Mutual Telephone Company has elected the following officers: I. E. Miner, secretary; I. H. Counsil, treasurer; C. Chambers, R. M. Mick, B. T. Littler, directors.

FRANKLIN FALLS, N. H.—At a recent meeting of the stockholders of the Citizens' Telephone Company the following board of directors was

THE WEEK'S MESSAGES—Continued.

elected: A. W. Abbott and John Ashman; Laconia; J. H. Dow, Henry J. Odell, True E. Prescott, Lakeport; Victor Hazerick, H. Bickford, Lakeport; W. B. Fellows, Tilton; Herman J. Odell, Franklin; A. W. Abbott, president; S. B. Cole, treasurer, and Henry J. Odell, general manager.

LANCASTER, N. H.—The Citizens' Telephone Company has elected the following directors: A. W. Abbott, W. B. Fellows, H. J. Odell, J. H. Dow, Henry J. Odell, V. Haserick, H. Bickford and T. Presscott.

HERRICK CENTER, PA.—The newly elected directors of the Northeastern Pennsylvania Telephone Company met at Herrick Center and organized by electing E. M. Ledyard, president; F. J. Osgood, first vice-president; D. R. Braman, second vice-president; F. E. Benson, secretary, and W. E. Perham, treasurer.

NEW HOLLAND, PA.—At a meeting of the Enterprise Telephone & Telegraph Company held at New Holland the following officers were elected: President, Solomon S. High, of Blue Ball; treasurer, E. H. Burkholder, of Farmersville; secretary, William Stauffer, of New Holland. The concern was capitalized at $25,000, of which all the stock is taken, there being between four and five hundred subscribers.

ASHLAND, WIS.—The stockholders of the Home Telephone Company at their annual meeting elected the following officers for the ensuing year: C. A. Lamoreux, president; J. Yderstad, vice-president; T. C. Jacks, secretary; Geo. H. McCloud, treasurer. The above named, together with E. A. Strong and Dr. H. T. Rohors, will constitute the board of directors.

RATES.

WINSTED, CONN.—In order to compete with the local company, the Southern New England (Bell) Telephone Company is putting telephones in houses at $18 per year, discounting the bill $9, virtually giving six months' use free.

CHARLOTTE, MICH.—The Eaton County Telephone Company has raised its rates on resident service to $10 per month from $9. The Bell Company still holds its rate at $12 per month for residences.

SAGINAW, MICH.—The Valley Telephone Company will hereafter charge a flat rate of $300 a year for service between Saginaw and Bay City. Single calls will be 10 cents.

DULUTH, MINN.—The special committee appointed by the council to look into the matter of allowing the Zenith Telephone Company to raise its rates will report in favor of a concession to the company.

FREMONT, NEB.—The Fremont Telephone Company has presented a petition signed by an overwhelming number of its subscribers asking that the sliding scale of rates be put in force to the city council.

SARATOGA SPRINGS, N. Y.—The Hudson River (Bell) Telephone Company has notified all its subscribers who have telephones in their residences on six party lines that the monthly rental will be reduced to $1, and they will have four party lines instead of six.

COMBINATIONS

MIAMI, FLA.—J. C. Gramling has sold his interest in the Miami Telephone Company to James Sanders and E. T. Clyatt.

CEDAR FALLS, IA.—There is prospect of the Cedar Valley and Black Hawk Telephone Company consolidating.

PERSONAL.

MINNEAPOLIS, MINN.—C. H. Judson, general superintendent of the Twin City Telephone Company, will sever his connection with that company July 1, and will go to Kansas City to take charge of the Home Telephone Company's plant in the capacity of general manager. Mr. Judson is one of the oldest workers in the Independent field. He came to Minneapolis at the time of the organization of the old Mississippi Telephone Company as an assistant to J. C. Hubbinger, who was the promoter. Two years ago, when the Twin City Telephone Company was organized, he became general superintendent.

ELKHART, IND.—The Home Telephone Company held a meeting recently, at which Manager Fister handed in his resignation. The new manager is Mr. J. K. Johnson, of Lexington, Ky., who has been manager of the Lexington Home Telephone Company for seven or eight years. Mr. Fister will go to Rochester, N. Y., and take a position with the Stromberg-Carlson Tel. Mfg. Co.

KENTON, O.—C. E. Nicholas, manager of the Kenton Telephone Company, has been granted a patent on a tubular lightning arrester.

OBITUARY

PLAINFIELD, N. J.—Charles E. Buell, a prominent resident of Plainfield, died in Atlantic City, where he went two months ago for his health. He won distinction as an inventor, having been a patentee of improvements in telephone systems.

MISCELLANEOUS

EVANSVILLE, IND.—Councilman C. F. Culbertson has been arrested on an indictment returned by the grand jury charging him with attempting to bribe. During the trouble over the Cumberland Telephone Company franchise recently three councilmen, including President McCutchan, testified in depositions that Councilman Culbertson offered them $2,000 if they would vote against revoking the company's franchise. This evidence was the basis for arrest.

WINFIELD, KAN.—Mayor Johnson has served notice on the Bell Telephone Company to cease erecting poles and extending lines until it has a permit from the city to do so. The Bell franchise expired a year ago. An Independent company dropped in here two years ago, built a fine system, and has secured practically all the local business. The Bell people cut rates to 50 cents a month, but few subscribers were obtained.

ITHACA, N. Y.—E. H. Chapman, superintendent of the Ithaca Telephone Company, announces that his company has closed a traffic agreement with the Caroline Telephone Company.

RUSHVILLE, N. Y.—The Grange Telephone Company and the Schuyler County Central have entered into a traffic agreement.

MASSILLON, O.—Every business house, private residence and office in the city of Massillon using the Bell telephone has been requested to have it removed. The request was made as the result of a strike involving two electrical workers for the Central Union Telephone Company by the Trades and Labor Assembly. Many of the large houses have complied with the demands.

New Construction in the Field

TOMBSTONE, ARIZ.—The extension of the Tombstone Telephone Company to Benson has been completed.

FREEPORT, ILL.—The Illinois Central Railroad Company is considering the establishment of a telephone system on the line from Freeport to Minonk. The present telegraph wires will be used.

RINARD, ILL.—The Pittman-Pettijohn Telephone Company is meeting with remarkable success. Over $10,000 has already been subscribed, and the lines are being rapidly extended. Poles have been set from Rinard to connect the following places: Johnsonville, Orchardville, Round Prairie, Wayne City, Cisne, Enterprise, Mount Erie, Flora and Clay City.

STERLING, ILL.—The Interstate Telephone Company is constructing a new toll line between this city and Prophetstown. The work is being done by the Conklin Construction Company.

BLUFFTON, IND.—When the United Telephone Company finishes the work it has started for the summer in this city the equipment of the local office will be second to none along the entire system.

MARION, IND.—The contract for the construction of the Landesville Rural Telephone Company's lines and equipment has been let to Alex. Lindsey, Charles Binegar and George Ray, the former a well-known Marion contractor. The lines will be built in Washington and Van Buren townships in Grant county, and will extend over Huntington county.

TERRE HAUTE, IND.—Charles R. Duffin, manager of the Citizens' Telephone Company, announces that his company has completed the new long distance line from Terre Haute to Brazil.

DAYTON, IA.—The Dayton Telephone Company will build rural lines in this vicinity.

MARSHALLTOWN, IA.—The Interstate Telephone Company will extend its line to Little Sioux from Marshalltown.

ONAWA, IA.—The Onawa Telephone Company is constructing a new line to Decatur.

CLEARWATER, KAN.—The Home Telephone Company has its poles up and wires strung to this city. The company will complete the system as soon as possible.

TOWANDA, PA.—General Manager Thayer, of the Bradford County Telephone Company, is pushing construction work between Wyalusing and Wysox.

WASHINGTON, PA.—The Federal Telephone Company expects to have its Jeannette exchange in operation in a few weeks.

YORK, PA.—The York Telephone Company has purchased a lot, and

THE WEEK'S MESSAGES—Concluded.

will erect, at a cost of $100,000, a five-story steel and granite exchange and office building.

HOWARD, S. DAK.—The citizens of Clearwater township are agitating for a rural telephone connection with Howard, and at present it looks a feasible proposition. Two days' work by Manager Wisard secured fifteen patrons.

MANITOWOC, WIS.—Work is completed on the extension of the lines of the Manitowoc and Western Telephone Company, from Cooperstown to the Mirable Caves Hotel summer resort. Other general improvements are being made by the company, and during the year it is proposed to construct a line from Cooperstown to Francis Creek. New stations have been opened at Tans, Menchellsville and at the Caves Hotel. Officers of the company are: President, H. O'Connell; secretary, J. P. Watt; treasurer, W. Killen, and manager, George Whitman.

SUPERIOR, WIS.—The People's Telephone Company has received apparatus for the construction of a new exchange. The new board will have a capacity for 200 instruments.

HUMBOLDT, TENN.—W. D. Smith, superintendent of the Home Telephone Company, which is now operating at a number of places in West Tennessee, has been in Humboldt and states that his company will construct a line from Jackson to Humboldt within the next few days.

PUTNAM, TEXAS.—W. A. McCreight has completed and now has his telephone exchange in operation. The line to Scranton, Atwell and Cottonwood will be completed at the earliest possible moment.

BOOK NOTICES

The Association de la Presse Technique, of 20 Rue de la Chancellerie, Brussels, Belgium, has issued its third *Index of the Technical Press*, which is fully four times the size of the first issue. An abstract from the preface will explain the purpose of the publication and its nature:

"The Association de la Presse Technique commences with the present a series of *Indices* giving: *The title with a brief explanation, the name of the author, the origin, the date of publication* and *the length* of the articles of general interest appearing in the principal technical journals throughout the world. Owing to the material impossibility of publishing an Index or series of Indices expressed in the different languages in which the articles were originally published, we have decided to issue the present series in the three principal languages, commercially and industrially speaking. We therefore index the English, French and German journals and reviews in these languages, respectively. For those journals published in languages of Latin origin—Italian, Spanish, etc., as well as the Russian papers, the French language is employed. The Scandinavian and Dutch journals are indexed in German."

Indices dealing with Chemical Technology, the Textile Industries and numerous other branches will follow at an early date.

Telephony. By Arthur Vaughn Abbott, C. E. To be complete in six volumes. Part I.—The Location of Central Offices. Part II.—The Construction of Underground Conduits. Part III.—The Cable Plant. Price per volume, singly, $1.50; set of six, $6. The books are illustrated, well bound in cloth and average about 170 pages. A paragraph from the announcement of the series will explain its purpose:

> There is telephone literature galore that occupies itself with the discussion of the theory of receiver and transmitter, and a description of the various forms of apparatus used in building telephone exchanges. But there is little information that concerns itself with the engineering design of telephone plants. It is the attempt of the author in this series to prepare a manual that shall deal with the latter phase of the problem, with particular reference to a consideration of the economic features, which lead to the installation of the best plant for the least money.

Part I. takes up the matter of the Location of Central Offices. Methods are given by means of which the most economical location, considering wire costs, for the central office for any distribution of substations may be determined. The subject of location of branch exchanges and trunking and trunks are also treated from an economic standpoint. The subjects taken up are treated quite exhaustively. A chapter of excellent telephone definitions is given in this volume.

In Part II. Underground Conduits and systems, the materials of which they are constructed, the methods of their construction and their costs are taken up. The subject of manholes receives due attention. As in the other volumes, the getting of the best thing for the least money is always kept in view. A complete set of specifications for the building of the different types of conduits is included. Graphical tables are given, by means of which the cost per conduit foot for different classes of construction, with different numbers of ducts, can be instantly reckoned.

Part III. deals with the Cable Plant. It opens with a chapter on circuit design and in following chapters deals with the mechanical properties, installation, costs and construction of cables and cable plants. A separate chapter is devoted to electrolysis. A complete set of cable specifications are incorporated in the volume.

Part IV.—Open Wire Lines, will be ready shortly. Parts V. and VI., which will deal respectively with The Substation and Switchboards and The Central Office, will be ready in October.

TRADE NOTES

The Jos. A. Hind Tie and Lumber Company announce that Mr. S. S. Philbrick has retired from its presidency, and that he will be succeeded by Mr. Jos. A. Hurd.

The Swedish-American Telephone Company have just issued an attractive pamphlet entitled "For They Themselves Have Said." The pamphlet is an up-to-date method of advertising the merits of this enterprising concern's output. It's yours for the asking.

W. C. Sterling & Son, of Monroe, Mich., have on hand at all times ready for immediate shipment between 100,000 and 150,000 telephone poles. They are devoting the greater part of their time to filling orders for poles and ties, and guarantee satisafction. They have recently made extensive shipments, extending even into Egypt. The United States cedar is considered much superior to the Egyptian cedar, as it is longer lived, withstanding the climate much better than the native Egyptian wood. They would be pleased to give estimates to any company contemplating the erection or extension of electric or telephone lines.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

TELEPHONE system, 200 subscribers, paying $2,000 net per year and increasing. Good long distance connections; invoices $7,200; standard construction, fine service, no competition, good rates. The property will be closed out August 1st to highest bidder. Address BOX 59, care The American Telephone Journal, New York.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

A BELL MANAGER wants position as manager or assistant with first-class Independent company. Will be at liberty July 1st. Address BOX 58, American Telephone Journal, New York.

POSITION.—Competent telephone man desires position; six years' experience in both inside and outside work. Thoroughly understands common battery and magneto systems. Best of references. Address BOX 60, care The American Telephone Journal, New York.

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The American Telephone Journal

VOLUME VIII *SATURDAY, JULY 18, 1903* *NUMBER 3*

COMPOSITE CIRCUITS—ARTICLE III.

By Arthur Vaughan Abbott.

IN the preceding numbers of The American Telephone Journal the principles of composite circuits have been developed and the apparatus elements necessary to the simultaneous transmission of telephone and telegraph messages exhibited. To complete the survey a few examples from practice may be cited.

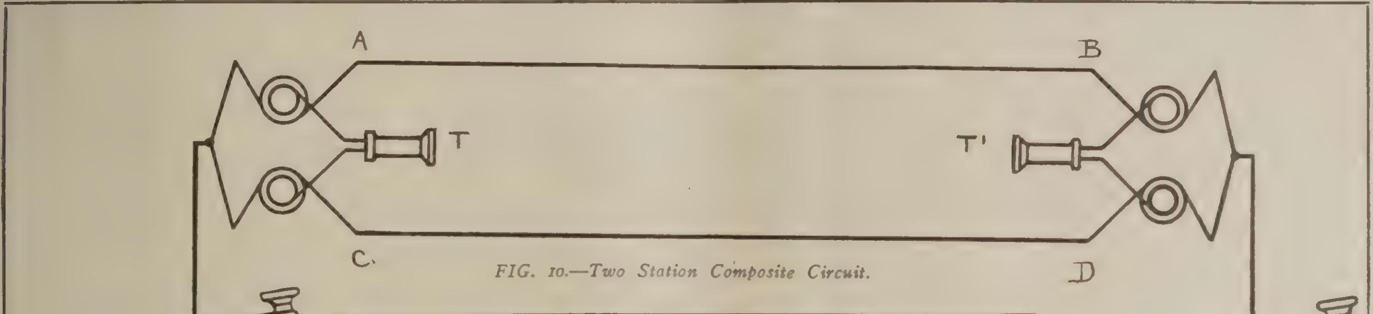

FIG. 10.—Two Station Composite Circuit.

Fig. 10 shows a circuit designed something after the fashion of the duplex telephone system. There is a metallic circuit, *A B C D*, equipped with two telephone stations, *T* and T^1, which can talk to each other with little retardation. At the center of these coils the telegraph instruments are tapped off on the Wheatstone bridge plan. By this means the apparatus is simplified, and the use of so many condensers and retardation coils is partly avoided. Fig. 11 is a composite circuit that has for several years been in successful and acceptable operation upon many lines in Europe, for, owing to some unknown reason, our foreign associates seem to utilize the composite system to a greater extent than employed in this country. The keys A_1 and A_2, together with the batteries T_1 and T_2 and sounders K_1 and K_2, may be any desired form of telegraph apparatus, either Morse or Hughes system. The condensers C_1 and C_2 are often made adjustable, in order that the best effect may be obtained under varying conditions. Paper condensers will answer the purpose, though those constructed of mica are much to be preferred, as offering greater immunity from injury due to static discharges. The coils O_1 and O_2 must be carefully wound and perfectly balanced with the line at the electrical center, which is best attained by experiment. The telephone station apparatus must be selected with great care, having high wound bells and open generators, with carefully constructed and highly insulated induction coils. To preserve balance, a split coil has been suggested with receiver taken out of center. High wound and highly insulated receivers are also desirable.

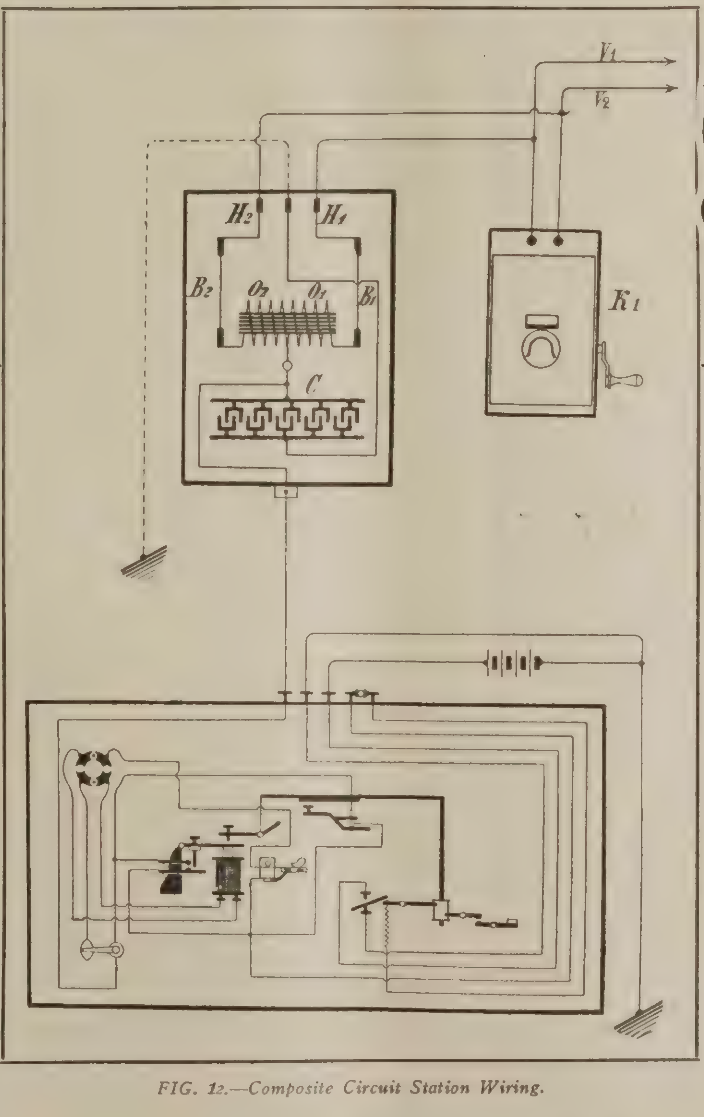

FIG. 12.—Composite Circuit Station Wiring.

Fig. 12 is a detail showing all of the station wiring; the arrangement of condenser should be noted, as it is shown split into five portions. Line and ground are taken off the center section. Two adjustable sections are provided on either side of middle, which may be cut in and out of circuit at pleasure by means of plugs. The retardation coil and condenser is usually mounted on a wall-board secured to the sides of the building. The lower portion of Fig. 12 shows the arrangement of the telegraph apparatus when adapted for the Hughes system. The arrangement of these circuits is so very self-evident and familiar to every telegraph

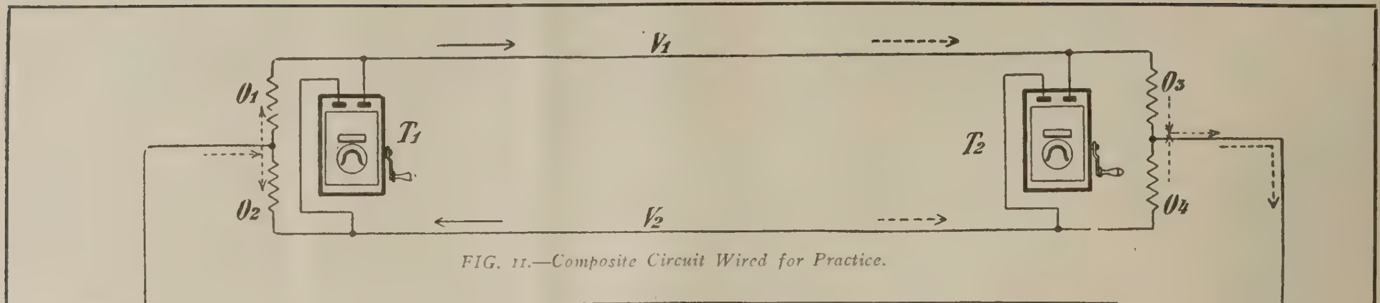

FIG. 11.—Composite Circuit Wired for Practice.

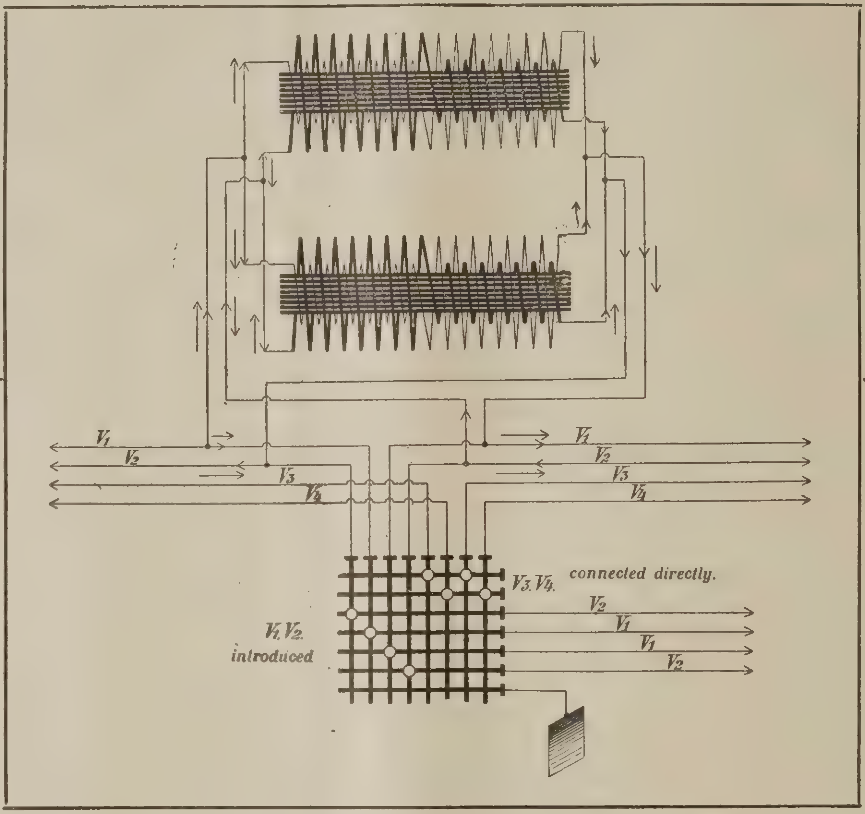

FIG. 13.—Composite Circuit, Connections to Coil.

operator that it is superfluous to devote further space to their consideration.

Fig. 13 shows the details of the arrangement of the impedance coils, which are necessary to the composite circuit, and an approved arrangement of carrying lines through the intermediary stations. The direction of the arrows in various circuits show the direction of the currents. Directly below the impendance coil an ordinary plug switch is mounted and, as shown in Fig. 13, so connected to the line as to permit any rearrangement of circuits that may be desirable. This enables the operator either to cut telegraph or telephone circuits uninterruptedly through station.

To install and successfully operate composite circuits requires the exercise of much care and a better standard of maintenance than is essential upon common toll lines; in exactly the same manner as common battery systems necessitate better lines and high insulation, better maintenance with a more careful supervision of switchboards than is required for the magneto system. In many respects this is desirable, because only too frequently telephone companies become exceedingly careless and allow their plants to run along in a slip-shod condition, so that anything which forces the general manager to a higher standard of apparatus and service is distinctly advantageous. Wherever used the composite circuit has proved itself a valuable adjunct to telephone plants, and one capable of materially improving the balance sheet, so that we commend a trial thereof for those plants whose toll lines are becoming crowded or wherever there appears to be an opportunity by the use of the composite circuit to increase the commercial efficiency.

GROCER'S FREE TELEPHONE SERVICE TO CUSTOMERS

By J. M. Green, *Special Correspondent.*

THE Davis Mercantile Company, of Topeka, Kan., is the first company of that city that has made an effort to increase its business by the adoption of a plan of putting telephones in the homes of its customers free of charge. The idea is new and untried in Topeka and its progress and the results from it will be watched with great interest, not only by the company's contemporaries in the grocery and fresh meat business, but also by the local telephone companies. The mercantile company is offering to install a telephone free of charge in the homes of all patrons whose orders from the firm amount to $25 per month or more. To customers whose monthly bills average less than that amount the company is offering a salvage or rebate of 5 per cent. of the amount of the monthly bill to apply on the rental of the telephone. That is, for example, if a customer uses $20 worth of goods from the firm the firm allows 5 per cent. of this, or $1, to apply on the monthly rental of the telephone. As telephone rental in Topeka is $1.50 per month, the $20-customer would get the use of a telephone for a month by paying the additional fifty cents.

In explaining the working of the scheme Mr. Davis, head of the mercantile company, said that by the installation of telephones the services of an "order man" could be dispensed with and the expense of all of the telephones would be but slightly greater than the salary of the order man and that this kind of service would be much more satisfactory. He claims that he already has in service about 60 of the Independent Company's telephones, and thinks that he will increase the number to 100. He says that by having the telephones so that his customers can order when they please he gets better results in the way of early orders than he did when he had the order man on the route. Especially is this true regarding vegetable and garden truck, which it is necessary to order early from trucksters. He also claims that by having the use of the instruments he is increasing his business by at least 10 per cent., as people order oftener. If they forget something at the first order it is an easy matter to again call up the store and order what was forgotten.

SOME STEPS IN THE EVOLUTION OF CIRCUIT DESIGN—AUXILIARY AND NIGHT BELL SIGNALS—ARTICLE XIV

By J. C. Kelsey.

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THE earlier common battery system used a four-volt lamp, both in line and cord signal service. The first two years found these boards replacing these lamps once a year, and as they cost at that time thirty-five cents each, the lamp bill for an exchange of 3,000 lines was not a small item. The cord lamps suffered most, the reason for which will be shown in the discussion of the four, eight and twenty-volt battery repeating coil system. The liability of a line lamp to burn out was a strong objection, and necessitated a device which would signify to the operator that some subscriber was calling.

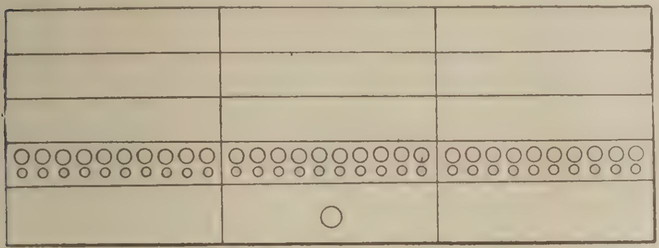

FIG. 1.

This is accomplished by the aid of a large lamp, underneath the line lamps and answering jacks, which will light, even if the line lamp is destroyed, as long as the line relay is energized. Seeing this pilot lamp lighted, the operator knows that some one is calling whose lamp fails to illuminate. She has to plug in all the jacks until she finds one that extinguishes the pilot, whereupon she answers and reports to the chief operator. This arrangement is shown in Fig. 1, which shows a bank of 100 line lamps and answering jacks with the pilot lamp underneath.

To accomplish this the lamp sockets were wound with turns of German silver wire at their base, one hundred ohms for a four-volt lamp; as the lamp is twenty ohms in itself, it is not affected by such a shunt. In the current feeder a relay is placed sensitive enough to operate through a hundred ohms, and having so high a carrying capacity that it will furnish current enough for the whole hundred line lamps.

Fig. 2 shows the position of the auxiliary relay *AR*, which closes contacts of an eight-volt battery about the eight-volt pilot lamp, or auxiliary signal *AS*. All the line lamps receive battery through this one ohm relay, *AR*, when the line relay closes the contacts of the line lamp and battery. But supposing that the lamp is dead, enough current will pass through its hundred ohm shunt to energize *AR*, which lights *AS*. But a four-volt battery, through a hundred-ohm resistance, will not send much current—hardly enough to energize relay *AR*.

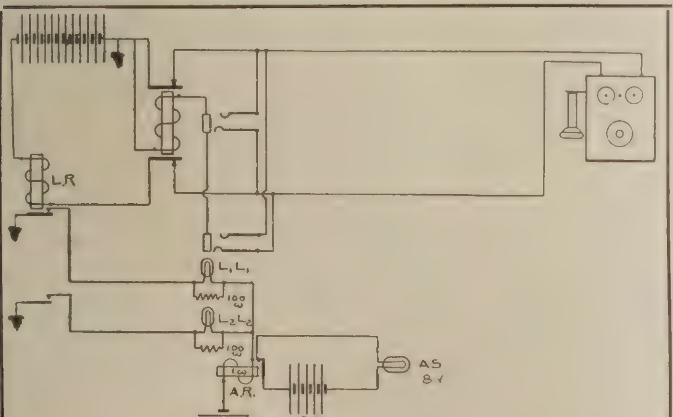

FIG. 2.

Fig. 3 shows a device originating with the Western Electric Company, to overcome this difficulty. It is a compound relay, with one winding on one core, and two windings on the other. Of these, one is a high resistance winding, and the other a low one. By this device the four-volt current that flows through the hundred-ohm winding pulls up its armature and closes contacts for the eight-volt current through the eight-volt lamp, which is lighted. In parallel with the eight-volt lamp is a winding of 250 ohms, wound around the core of the second relay. This 250 ohms is too great a resistance to take much current from the lamp, yet is enough to close its contacts. So far, the line lamp is not lighted, although current is flowing through it. The lamp requires one-fifth of an ampere, but in this circuit one hundred ohms stand in the way. Therefore, the closing of the contacts allows current to flow through a one ohm winding on the original relay, paralleling the hundred-ohm winding, without reducing the magnetic strength of the relay, and very materially reducing the resistance in series with the line lamp. The shunt winding not only makes the resistance of the circuit inappreciable, but adds a carrying capacity to the relay combination of ten amperes or more.

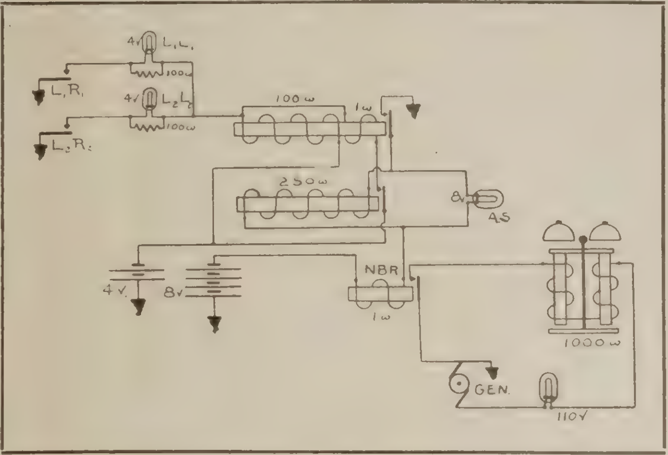

FIG. 3.

Fig. 4 shows the auxiliary relay in place, with eight volts fed to the lamp, and its parallel core winding. In series with the eight-volt circuit, another low resistance relay is placed, so that any one of the pilot lamps, lighting in any operator's position, will draw its current through the relay, and energize it. When energized, the night bell relay, *NBR*, closes contacts about a 110-volt lamp and a thousand-ohm ringer, which rings until the

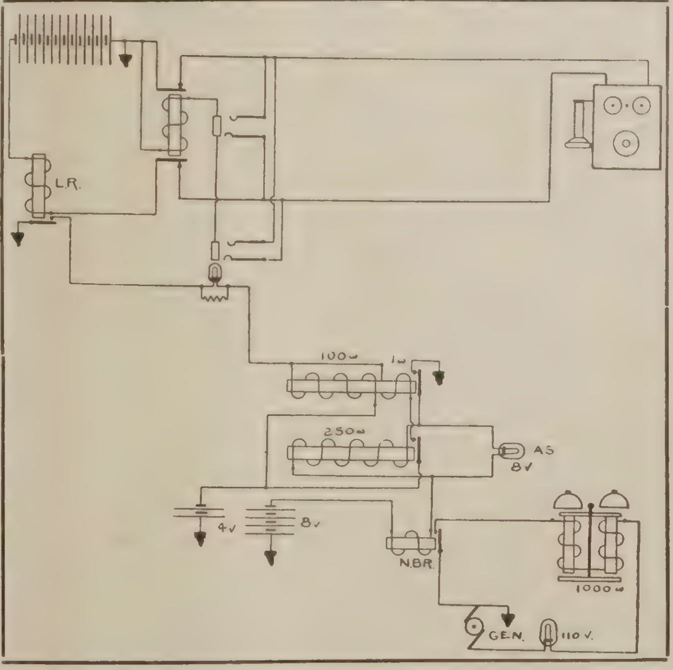

FIG. 4.

operator plugs into the jack of the line calling, cutting out the line lamp, then the auxiliary lamp, and the night bell.

The latter systems of this nature use twenty four-volt lamps for line signal work, and the life of the lamps may be expressed by a comparison which shows that a four-volt system used 2,000 lamps annually, while the twenty-four volt system averaged thirty to forty.

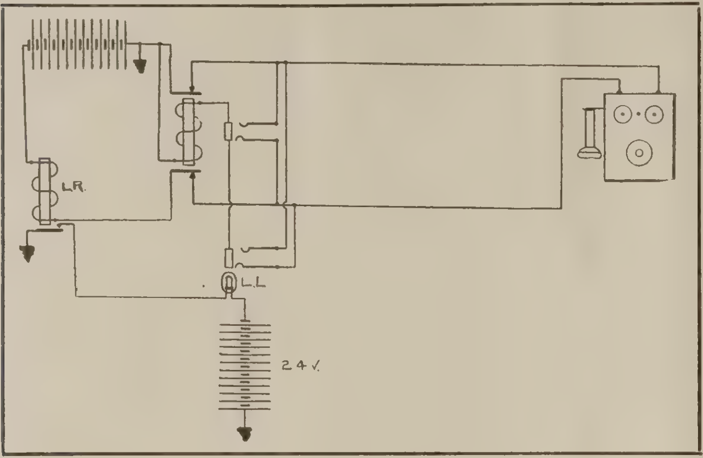

FIG. 5.

The newer system shows a radical change in the method of bringing in the pilot lamp. The shunting of the lamp socket does not play a part. While the lamp is virtually shunted, the manner of doing it is unlike the former one. In Fig. 5 the line relay, *LR*, closes contacts through the battery, line lamp, *LL*, and ground.

In Fig. 6 we find a circuit has been run parallel to the lamp from the battery. It is of sufficient resistance, or it would dim the line lamp, *LL*. This resistance should not be more than 400 ohms, as the lamp itself has a resistance of 240 ohms. And during the day the battery is being charged so the shunting effect of 400 ohms will give just about the proper brightness. For the auxiliary relay, a hundred ohms is chosen, placed in series with a small 300-ohm spool, which is usually placed on the relay frame, close to the line relay. At *C* the parallel circuit is joined so that the closing of the relay contacts will not only light *LL*, but will give the battery a chance to flow to ground through the auxiliary relay, *AR*. From this it can be seen that the line lamp may be entirely removed, and in no wise interfere with the action of the auxiliary relay. This gives a sensitive relay, which does not depend upon the amount of the current passing through it, and it will easily detect any leakage of current in the bank of relays to which it belongs. This method is confined to each panel of forty lines, so that if a lamp is open the operator will not have to look through the entire hundred lines.

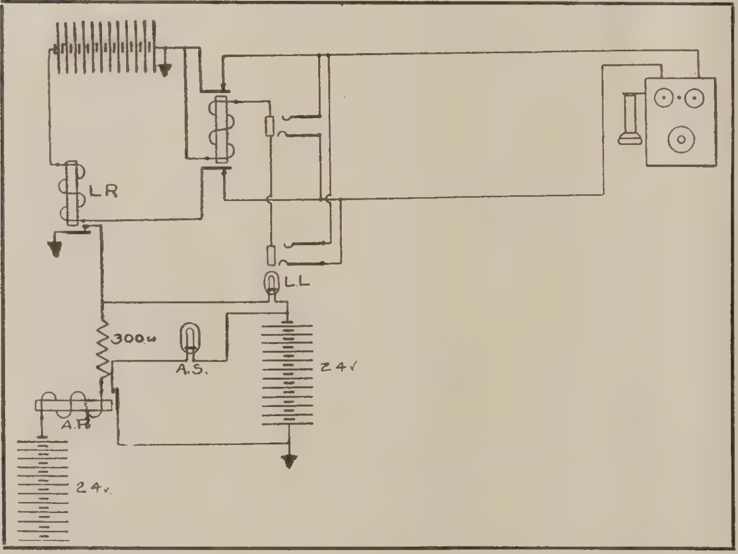

FIG. 6.

In Fig. 6 the relay *AR* closes contacts about the pilot lamp and the twenty-four-volt battery, and causes it to light.. When *AR* is energized it lights the pilot, but the current which illuminates *AL* comes through the night bell relay, which, as in the former case, closes the contacts of a ringing generator and a bell which notifies the operator.

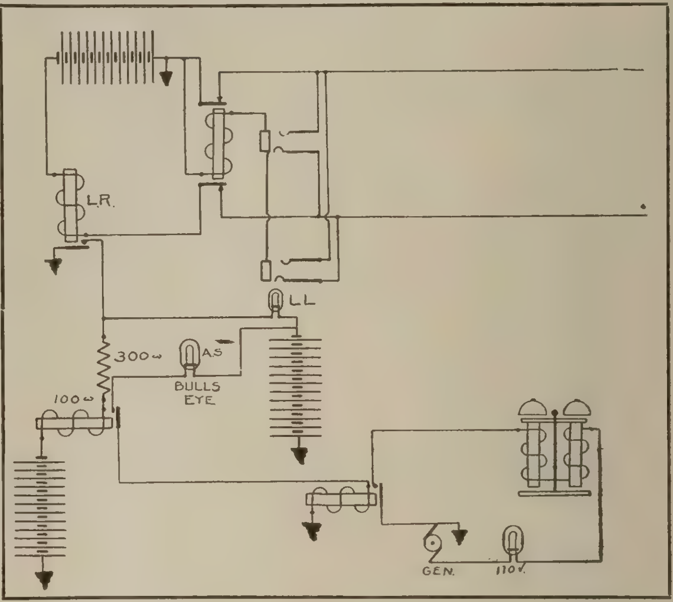

FIG. 7.

The simplest method of bringing in the auxiliary relay and night bell is shown in Fig. 8, in which *LL* is the line lamp, *AR* the auxiliary relay, *AL* the auxiliary lamp, *NBR* the night bell relay, and *C* the generator. This method is accomplished by means of sensitive, but low wound, relays, put in the line of current supply. They are capable of carrying twenty-five amperes of current, and will readily pull up with the current furnished for a single lamp. This plan asumes that there is little likelihood that lamps will burn out, and experience has justified this. When *LL* lights after *LR* is energized, *AR*, being in the path of the current supply, is energized, causing current to flow through *AL* and *NBR*.. *NBR* closes the night bell circuit, and if in circuit the bell will ring.

Referring to Fig. 4, it may be seen that if the armature of the relay with the 250-ohm winding is permanently held up by adjustment, it will not depend upon the eight-volt battery. It has been the case where the fuse has been blown on the auxiliary lead, thereby rendering the relay useless and crippling the entire system, because no one can call central. It is either necessary to replace the fuse, which takes time, or screw up the contacts of the 250-ohm relay, which might take more time. Therefore, it is not a bad precaution to take to tighten the adjusting screws on all the auxiliary relays with the 250-ohm windings. The other two circuits described give little trouble and no precaution need be taken.

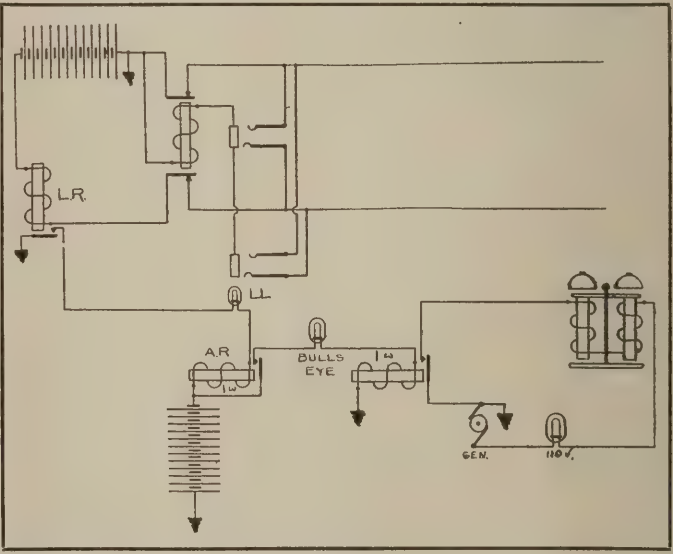

FIG. 8.

WHAT THE NATIONAL ASSOCIATION PROPOSES TO DO

NOW that the National Telephone Association is officered by new men and that the new officials have taken hold of the work, opening a way for a different policy, that of development, the Association makes a statement of what it intends to do and will do. The legal battles have been won and now all is clear sailing for the progressive Independent. The new policy adopted, as outlined in the following announcement, cannot but appeal to every Independent operator.

INDEPENDENT TELEPHONE ASSOCIATION OF THE UNITED STATES.

Brother Independents:

At the seventh annual convention of the Independent Telephone Association of the United States, held at Chicago on June 24 and 25, a new constitution was adopted and a new set of officers elected. By the new constitution it is provided that membership shall be by individual Independents, and not by companies, as heretofore. The membership fees are $2.00 for initiation and $1.00 a year annual dues, making the expense of belonging to the association $3.00 the first year and $1.00 a year thereafter. There will positively be no other fixed expenses whatever to members.

Membership in the National Association entitles the holder of a membership card to many privileges and advantages, among which are:

1. Access to all information and statistics in the possession of the secretary-treasurer.
2. Copies of all the proceedings of the association conventions.
3. Copies of all papers and documents published by the association.
4. The assistance of the association in any Independent enterprise.

The patent battle is over and won. The association has protected the rights of every Independent in the courts, and the reorganization of the association at this time is for the purpose of making it a practical and active help to Independent telephonists in every possible manner.

In order to carry out our plans we must have a large and representative membership, and we want you and every man connected with your company who is eligible to membership. Moreover, we want you all to help us make our plans a success. We welcome suggestions from you and will gladly listen to advice. With 10,000 members, which we hope to secure this year, we would have $20,000 as a permanent endowment fund and $10,000 a year for expenses. With that we can do much.

Here are some of the plans we have made and what we estimate they will cost:

First—The distribution of 10,000 copies of practical articles each month, printed in pamphlet form, written by leading Independent authors on the various subjects, on such matters of general interest as "Toll Lines," "The Farmer Problem," "Maintenance Cost," "Depreciation," "Independent Telephone Engineering," "Franchises," "Independent Finances," etc., etc. These articles will be contributed without expense to the association through the generosity of their authors.

Estimated cost of printing and distribution, $2,400 a year.

Second—Gathering and compiling complete statistics of Independent telephone companies. This will be done by the secretary-treasurer, who will send out the necessary application blanks for this purpose. It is planned to cover the entire telephone field, state by state, and to publish the report in book form when completed. The statistics gathered will cover all points of importance and interest connected with the building, maintenance and operation of a telephone exchange. Copies of the report will be furnished to leading banks and investment houses throughout the United States, and will also be sent to all American financial journals. A summary of the report will be sent free to association members. The complete report will be sold in book form at a profit to the association.

Estimated cost of gathering and compiling statistics, $1,200 a year.

The publishing of the report is planned to be made by subscription, and the report is to be printed at a profit to the association. It is, therefore, not estimated as a part of association expenses.

Third—The carrying out of a national campaign of education in Independent telephony, including letters to every Congressman and Senator of the United States, the Governor of every State in the United States, the Mayors of principal cities, and reports to leading newspapers and financial journals covering the progress and public importance of Independent telephony and showing its soundness and stability as a business enterprise.

Estimated cost, $3,000 a year.

Fourth—The organization of a department of Independent Telephone Securities, and the information gathered by this department will be published quarterly. The association will act as a clearing house for all Independent securities, and will refer intending investors to the list of securities offered. The association will also, whenever practicable, refer association members having securities to sell or propositions to promote, to banks and other financial organizations dealing in telephone securities. For this purpose a list of such institutions will be kept on file in the office of the secretary-treasurer.

Estimated cost, $1,200 a year.

With a membership of 10,000 these plans will require an estimated fixed annual expenditure of $7,800, leaving a balance of $2,200 for miscellaneous expenses, without touching the endowment fund created by initiation fees, which, with a membership of 10,000 would amount to $20,000. This would, doubtless, be invested under the authority of the executive board in bonds and other securities yielding an additional income to the association.

Secretary-Treasurer Date________________

Independent Telephone Association of the United States:

Enclosed find $3.00, being $2.00 Initiation Fee and $1.00 Annual Dues in the Independent Telephone Association of the United States.

Name________________

Address________________

____

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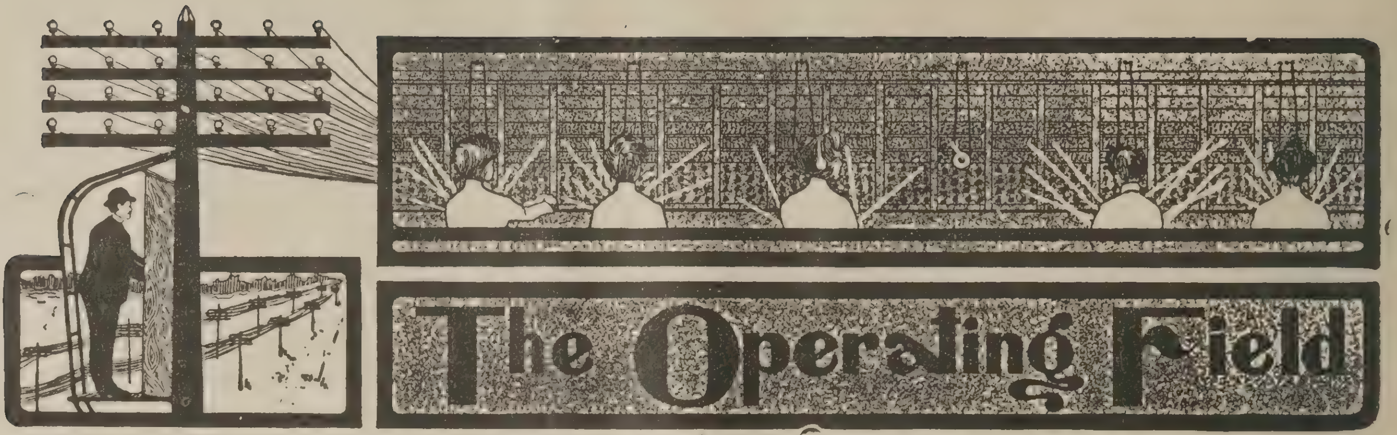
Name of company represented________________

This programme can and will be carried out. To do it, we need your assistance, sympathy, good will and support. Help in the campaign for membership by joining yourself, and then secure at least one other member.

With 20,000 members we can do just twice as much as with 10,000, and, on the other hand, with 5,000 members we can do only one-half as much. Independent telephony has suffered for years by reason of lack of concentrated work along this line. You have suffered personally and in a business way. It will cost you, and has cost you, much more than the association membership expenses to be without this valuable assistance. The National Association is your association, if you will but make it so. It can and will help you individually, as well as the Independent movment everywhere. Your share of the expense is $3.00 now and $1.00 a year hereafter. We will pay you a hundred-fold in value for the cost. Send us your membership to-day.

This is not a money-making plan, but it is a money-spending enterprise. We will be economical with the funds entrusted to our charge, and will give you more than you expect in results. You will do a double service to your association and to yourself by joining without delay. We want to get started immediately, and you should receive our first report. Don't make it necessary to spend association money on postage to get your membership when we might better be sending you the results of our work.

Frank G. Jones,
Secretary-Treasurer.



PROSPECT OF RATE WAR IN UTICA.

By W. H. Campbell, *Special Correspondent.*

THERE is every probability that there will be a telephone rate war in this city before many days. The Bell company, which has always had a monopoly, is beginning to realize that its interests are at stake and that its business is ebbing away because of the lower rates and better service given by the Utica Home Telephone Company. The Home company opened its plant April 1 this year with 1,300 subscribers and since then the number has been increased to exactly 1,900, with several prospective contracts. The Bell company at first thought its interests would not be jeopardized, but now looks upon the work of its competitor with surprise. When the Home company commenced operations the Bell company had 1,500 subscribers, but this number has decreased to 1,082, with prospects of a greater decrease in future.

It is said that the Bell company will reduce its rates on August 1 in order to get additional business. When the Home company learned of this the directors put on their thinking caps and say they have decided on a novel method of competing. The plan of the Bell people will be to cut the rates on all of the party lines, and by doing this it will get a few residence contracts. Since July 1 the Bell company has been installing telephones on three months' trial. The Home company has in a few instances been giving a thirty-five days' trial. The people of Utica are interested in the matter and anxiously await the battle, which promises to be a keen one.

ASHLAND, WISCONSIN, COMPANY PAYS DIVIDEND.

WHEN the plant of the New Home Telephone Company, of Ashland, Wis., was first built, bonds were issued against it, and a large number of Ashland people bought them. The plant is practically owned by well-known residents of Ashland. Over a hundred different men among these are bond holders.

That a telephone company properly managed and furnishing service at the low rates given by the New Home Telephone Company can be successful, is evidenced by the recent payment made by this company upon its outstanding bonds. The Ashland bondholders have recently had 6 per cent. semi-annual interest coupons paid them by the treasurer of the company, and in addition a dividend of 1 per cent. has been declared upon the stock. The company's ability to pay the interest on the bonds and declare the dividend during the first few months of its life indicates in a measure what may be expected of it when it is older and more experienced.

PLANT COMPLETED IN SCHENECTADY.

AT a recent meeting of the directors of the Schenectady Home Telephone Company, of Schenectady, N. Y., the American Construction & Trading Company, by whom the telephone plant was constructed under contract, formally turned the property over into the hands of the local company. This plant is one of the best constructed telephone plants in the State, and is equipped with an underground cable system, in which line the company has set a good example, which is now being followed by the other companies owning wires in the city. The exchange has a switchboard second to none and a building devoted exclusively to telephone purposes. The capacity of the switchboard is being doubled to accommodate the rapidly increasing list of subscribers, and when complete will accommodate 1,920 lines.

The long distance lines, which now are connected with Albany and Cohoes, are rapidly being extended, and within a few days the Home Company can furnish service to over 6,000 telephones.

Many business men of Schenectady are heavily interested in the financial success of the plant, which seems already assured.

BELL ATTEMPTS TO RAISE RATES IN TEXAS.

AT a recent meeting of the members and directors of the chamber of commerce of Beaumont, Texas, resolutions were adopted condemning the proposed increase in rates by the Southwestern Telegraph and Telephone company and appointing a committee of three to devise ways and means looking to concerted action whereby the Independent telephone company might be given the patronage of the business men of the city and encouraged to improve and extend its service.

The resolutions were unanimously adopted. They depreciated the poor and inefficient service that the citizens of Beaumont had been compelled to endure from the Southwestern company and each member pledged himself that if the proposed increase went into effect to-morrow that he would immediately order the Southwestern company's telephone removed, and would use only that of the Independent company. The statement that the service afforded Beaumont was the worst afforded any town in the State, was applauded and there was no mistaking the pronounced sentiment of those present. The committee appointed to devise ways and means for future action is composed of Messrs. C. T. Heisig, chairman; J. H. Bright and W. A Crawford. They are instructed to report at a future meeting, which will be held shortly. Although the Southwestern company had been invited to have a representative at the meeting, there was no one present in their behalf.

PENNSYLVANIA COMPANY REJECTS BELL'S OFFER.

AT a recent meeting of the directors of the Farmers' Independent Telephone Company held at Indiana, Pa., the proposition made by the Indiana Telephone Company was rejected, says *Money*. The terms offered gave to the Farmers' Company the free use of the exchange of the Indiana Company at the county seat providing that the Farmers' in return would grant the same privilege over its lines, in the county, and agree not to establish an exchange there.

For various reasons, the terms were not accepted. In the first place according to the constitution of the Farmers' Independent Telephone Company, no contract can be made with another company for a period of over one year. The Farmers' Company has not been napping. Their lines now extend all over the northern part of the county, and in the Mahonings the majority of the progressive farmers are subscribers. Their lines are being extended slowly, but surely, to the eastern part of the county. Already, three lines are being extended to the county seat preparatory to connecting with the exchange here. The number of telephones in use on its system totals several hundred. The company's system extends through portions of Armstrong and Jefferson counties, as well as Indiana. Exchanges have been established at Punxsutawney and Brookville. Kittanning will likely have an exchange as soon as Indiana, and several other large towns will soon be connected with these lines. The lines being built to Indiana are known as the Plumville and Creekside, Marion Center and Kellysburg and Dixonville and Tanoma. Others will be extended soon.

PROGRESS OF ROME, N. Y., COMPANY.

By W. H. Campbell, *Special Correspondent.*

SINCE the Rome Home Telephone Company received a franchise in that city a large number of improvements in the service have been made and the Independent company is surely but slowly driving the Bell company out of business. It is only a matter of time when the Bell Company will surrender. They have fought the Independent company with unusual tenacity and at one time matters looked rather dubious for the local people, but when the city of Utica, which is fifteen miles east, secured a franchise, Rome was given aid and matters are now moving along serenely with the local company. The switchboard is being overhauled and its capacity will be increased to 1,500 lines. The company intends to install underground cables, which will extend from the office west about 1,400 feet and 300 feet on the east. When the plans are completed there will be 700 200-pair underground cables installed. Because of this change a large amount of aerial work will necessarily be torn down. Beside this work, there will be 15,000 feet of aerial cable installed to take care of future subscribers. The company has a large number of contracts which it will be unable to fill until the above changes are made, as all the present cables are filled. The subscribers are now numbered at 1,000, but it is predicted there will soon be 1,500. The construction work is under the direction of Edward L. Cline, of Toledo, O.

The Bell Company has 80 subscribers in Rome at present, and of this number 45 are said to be on the free list. Before the Home company started operating the Bell company had 280 subscribers. There has been a change in the management of the local company. Mr. T. Odell, formerly of the Central Construction Company in Ohio and Kentucky and the Central Union Company of Ohio, has succeeded Mr. Hall, of Rome.

AN OPPORTUNITY FOR PRACTICAL MEN

Managers, Line Men, Trouble Men, Wire Chiefs, Inspectors, Switchboard Men.

The American Telephone Journal is desirous of constantly keeping its readers up to date and holding them in touch with the latest telephone ideas and the best telephone methods. There are many, many time and labor saving devices, originated by the men that are using them, that never are heard of by thousands of telephonists, to whom they would be of the utmost value. The American Telephone Journal wants to publish some of these ideas and methods, so that the telephone man at large can profit by them.

To that end, therefore, we solicit from every telephone man in the field some good, original, practical idea. All of you must have at least one, probably many of you have several. These ideas may pertain to any branch of telephony, line work, instrument setting, switchboard work, wiring, circuits or exchange bookkeeping—no matter what department they deal with, so long as you know that they are good and that they will work. If you have never written before, don't let that discourage you. We are not after literary works; what we want are ideas. If what you write does not read smoothly, we will fix it up here. If you think that it will help to make the thing clear, send a rough drawing to accompany your description. Often a glance at a drawing will give more information than a page of reading. Don't think that your idea is too simple to be of value. Often the simple ones are the best. We will pay for everything accepted at our regular rates.

Address them to the Associate Editor, American Telephone Journal, 116 Nassau St., New York City.

PITTSBURGH & ALLEGHENY BUSY.

THE Pittsburgh & Allegheny Telephone Company is rapidly completing the installation of the large contract awarded it by the Carnegie Steel Company, which included service at its Upper and Lower Union mills, Duquesne mills, and in a large number of the general offices in the Carnegie building, says *Money*. The awarding of these contracts was strictly on a basis of merit as with the Carnegie Steel Company good service is the paramount question. In all other directions the Pittsburgh & Allegheny Company is working diligently to keep abreast with the demand for its service. Poles are being rushed into McKeesport, Swissvale, Edgewood, the hilltop boroughs and other places. Poles are now on the ground between Pittsburgh and Johnstown. Bids for a new exchange to replace the one at Homestead are being received.

ATLANTA COMPANY ENTERTAINS EMPLOYEES.

PRESIDENT C. JEROME SIMMONS, of the Standard Telephone Company, of Atlanta, Georgia, was the host at a dinner given recently to the employees of the company. The affair was an informal celebration of the completion of the work of installing the new switchboard. Seventy-three young men were present, and the occasion was thoroughly enjoyable.

CHICAGO FRANCHISE CONTROVERSY.

MARCH last a committee, consisting of Mr. Linn H. Young, Alderman Francis D. Connery and City Electrician Edward B. Ellicott, made a report to the city council of Chicago, acting under instructions from that body. The purpose of the report was to inform the council what legal methods could be adopted for regulating existing telephone rates and improving the telephone service. The committee, after considering all things, recommended a schedule of rates which was based on the message as a unit.

The United Telephone Company, nominally Independent, of Hyde Park, Chicago, has now applied through Mr. Hayward A. Harvey, for a thirty years' franchise to conduct a telephone business in the city of Chicago on the message rate basis, as recommended last March by the above named telephone committee. The franchise provides for direct line rates, ranging from $60 a year with 600 calls and 5 cents for each excess call to $118 a year with 2,100 calls with 3 cents for an excess call.

It now develops that Mr. Harvey, who asks for the franchise, was several years ago an associate of Edward P. Meany, who is an official of the American Telephone and Telegraph Company, and there is every reason to believe that the men are still intimately connected. The franchise of the Chicago Telephone Company expires in 1909, and the move that has been made is believed to be an effort of the Bell company to get another franchise in Chicago. Although the committee from the City Council on gas, oil and light after a hard fight succeeded in recommending the bill for passage, it is very doubtful, even if the bill passes the Council, that it will ever be signed by the Mayor.

NORTHWESTERN KANSAS ASSOCIATION CONVENTION.

By E. A. Lankford, *Special Correspondent.*

THE Northwestern Kansas Telephone Association held its convention in Beloit, Kan., on Tuesday, July 10. The meeting was well attended, there being about forty delegates present. The work was for the most part done by committees. The most important proceeding was a decision to abandon the "keep-what-you-take-in" proposition, and to adopt the scheme of crediting each company whose line is used with ten cents and the originating station with fifteen cents. Some interesting papers were read. Two of them treated of the operation of toll lines and legal decisions concerning telephony. These papers showed that uniformity along these lines was lacking. The officers elected were: Frank H. Dougherty, of Concordia, president; Robert Postlethwaib, of Jewell, secretary; W. W. Dilworth, of Beloit, treasurer.

The Editor's Page.

THE ECONOMY OF TRUNKED TRAFFIC.

As has been thoroughly pointed out in the columns of this paper, the average total daily use of a subscriber's line does not exceed one hour. As the service is extended to smaller users this average period will probably tend rather to diminish than to increase. The average total daily use of a trunk line is more like eight hours. Therefore it is clearly more economical to use short subscribers' lines and plenty of trunks than to use long subscribers' lines and few trunks. This argues in favor of relatively small exchanges and small districts, giving a low average length of subscriber's line. As the local trunk carries the traffic of a dozen or more subscribers' lines it is sound commercial policy to spend on the one and save on the dozen. At present all exchanges in a large system are equipped with multiple boards, both at the A, or answering positions, and at the B, or incoming trunk positions. But it is only a question of time when it will no longer be economical to equip the A portion as multiple boards. As the number of exchanges and districts increases, the proportion of traffic originating at each exchange that is trunked to other exchanges increases, and the proportion of the traffic originating at each exchange that is local to that exchange diminishes. The multiple equipment at the answering positions serves solely for the traffic that is local to the exchange, and it will be economical to employ it only so long as the local traffic represents a considerable figure.

At the present time we will say that the average conditions in a big city are that 70 per cent. of the traffic is trunked and 30 per cent. is local to each exchange. The retention of the multiple jacks at the answering positions simply means that it is more economical to employ them than to trunk all the traffic. But there must be a dividing line somewhere. It could hardly be contended that if, say, 95 per cent. of the traffic were trunked and only 5 per cent. local it would still be economical to multiple the whole exchange on the answering sections. The dividing line must be a good deal lower down than that, and the smooth, accurate and rapid working of the relay system has probably put it lower than it formerly would have been put. The trunked connection is no longer the bugbear it once was. It now takes but a few seconds longer than the local connection, and is as accurately done in all respects as the local connection.

DR. RUHMER'S RESEARCHES

Some highly interesting details were recently given in a lecture at Berlin by Dr. Ernest Ruhmer of his researches with selenium, which resulted in the production of the selenium cells that gave such successful "wireless telephone" experiments last year. Some of these optical telephone experiments were noted in these columns at the time, and it will be remembered that Dr. Ruhmer succeeded in telephoning through space over a distance of several miles, using an arc-light transmitter and a selenium cell receiver. It took Dr. Ruhman years of experimentation to produce a successful selenium cell, but he has now acquired such a thorough knowledge of the substance and methods of preparing it that he can produce cells of almost any degree of sensitiveness in change of conductivity, under the influence of light. The type of cell most suitable for wireless telephony is the cylindrical selenium cell in an exhausted glass bulb. Cells have been made which increase their conductivity a hundred fold under the influence of intense light. As practically no residual effect is observed, the conductivity will instantaneously return to its initial value as the light is taken away, and will follow without any lag the fluctuations of a variable illumination. The selenium cell of Dr. Ruhmer practically forms a microphone operated by light waves of sound waves.

TELEPHONE CONDITIONS IN OTHER LANDS.

While we in this progressive country of ours have rapidly been doing so much along the line of long distance telephony, it has been making steady, if somewhat slow, progress in Europe. Long distance telephony in Europe necessarily becomes international telephony, because long distances, as we understand them, cannot be found in a single European country, except Russia, and Russia so far has made but little use of the telephone. During the past month a line was opened between Vienna and Hamburg, a distance of between 500 and 600 miles. There has lately been made an agreement between the British and French Governments for the establishment of telephonic communication between provincial towns in France and provincial towns in England, and also between the provincial towns of each country with the capital of the other. Apparently nothing has yet been done to put the agreement into practical effect, as the Chamber of Commerce of Cardiff has been moved to pass a resolution calling attention to the importance of the promised service and the desire of commercial interests to have it put into force. An interview with the Postmaster General is to be sought, to press the matter. At present telephonic communication between the two countries seems to exist only between Paris and London. Telephonically speaking, there is no reason why Edinburgh should not speak to Paris, but by the time the British P. O. and the French P. O. got the line joined up the Edinburgh man would probably have gone home to bed and the Parisian would have sought relief on the boulevards.

Far away Australia, that we, here, so seldom read about, has also been doing things telephonic. It is said that in that country there is not a town having a population of 3,000 or over which has not a telephone service. The charges have previously differed widely in the different states, but, as one of the consequences of federation, are being made uniform. The new scale provides for three different grades of service at different rates. The flat rate for city service is to be $40, for city and suburban service $50; these are for business houses. For residence service the very moderate figure of $25 has been fixed as a flat rate for unlimited service. Message rate ideas do not seem to have penetrated to Australia at all, and very little has been done in long distance telephony; while the use of public pay stations to put the telephone service within the reach of the general public is not understood at all. The service is a government monopoly and is hardly likely, for that reason, to make any serious progress.

TOLD OF THE ST. BERNARD DOGS

A French tourist relates that some time ago he set out to cross St. Bernard's Pass by himself, and got caught in the fog near the top. He sat on a rock and waited for one of the dogs to come, but in vain, and when the fog cleared away he managed to reach the hospice. On arrival he observed that he thought the dog a rather over-rated animal. "There I was," he said, "for at least six hours, and not one came near me." "But why," exclaimed one of the monks, "did you not ring us up on the telephone?" To the astonished tourist it was explained that the whole of the pass is provided with shelters at short distances from each other, all in direct telephone communication with the hospice. When the bell rings the monks send off a hound loaded with bread and wine and other comforts. The dog on duty is told what number has rung, and he goes straight to that shelter. This system saves the hounds their old duty of patrolling the pass on the chance of a stray traveller being found, and as the pass is for about eight months of the year under snow, this entailed very hard and often fruitless labor.

SALE OF LITTLE WOLF RIVER TELEPHONE COMPANY.

Editor AMERICAN TELEPHONE JOURNAL:

ONE of the most underhanded outrages ever perpetrated upon the stockholders of a corporation was the sale of the Little Wolf River Telephone Company's lines and exchanges to the Wisconsin (Bell) Telephone Company, whereby $67,000 of stock that was earning 6 per cent. net per annum was wiped out entirely and this by three gentlemen, two of whom were directors of the company and who had been trusted with its management by the majority of the stockholders.

How was it done? The three gentlemen in question are capitalists. They owned about $60,000 of bonds issued by the telephone company. As directors of the company, to whom was intrusted its management by over 100 small stockholders, they used the net earnings of the company to the extent of over $10,000 in making additions to the system. They used the money which was charged to interest account for the same purpose.

There was one debt of $2,000, on which they had paid no interest for nearly three years, and the creditor put this claim into a judgment. One of these three gentlemen bought this judgment in the name of his bookkeeper and made it a basis of an action for a receiver. A receiver was appointed. During the receivership an attempt was made to reorganize the company and an attempt was made to raise $30,000 among the smaller stockholders. Two-thirds of this sum was subscribed, but for the lack of the other $10,000 the receiver was ordered to make sale of the property, which was done, and the property, costing over $140,000 and earning over 5% on the entire cost, was knocked down to these gentlemen for $65,000. This was less than 90 days ago. Immediately overtures were made to the Wisconsin Telephone Company, which culminated in the transfer to that company on June 30 of all the franchises, lines, exchanges and equipments of the company at a price less than that which the gentlemen had themselves invested in it, to use their own statements.

	Independent.	Bell.
Appleton	900	600
Madison	1,800	1,000
Racine	1,600	300
Portage	400	none
Janesville	900	500
Lake Mills	100	none
Sun Prairie	200	none
Waterloo	100	none
Dodgeville	275	none
Lancaster	150	none
Richland Center	150	none
Boscobel	75	none
Fennimore	50	none
Sheboygan	800	600
Waupaca	225	50
Weyauwega	75	none
New London	110	120
Grand Rapids	500	none
Superior	1,000	500
La Crosse	1,000	600

Why was it done? Let the three gentlemen and the Wisconsin Telephone Company make answer. An opportunity was presented and an offer publicly made to take the property and protect the three gentlemen and every stockholder of the company as well, and these three gentlemen would not even consider the proposition to know whether it was made in good faith or not. It was for the sight of a little cold cash that the peace of these three millionaires was disturbed and for the sole purpose of satisfying themselves they sacrificed the interests of small stockholders to the amount of over $60,000, besides their own stock, if their statements are correct.

On the very day the sale was consummated certain stockholders were negotiating with Chicago parties to take the bonds of the company, but nothing but the ready cash would satisfy these gentlemen and the deal was closed.

Now, there are other people interested in this transaction than the stockholders who will want to know how the result of this sale will affect the Independent Telephone situation in Wisconsin. To be brief, it will clear the atmosphere, as the Wisconsin Company has taken the trouble and has subsidized certain local papers to advertise the troubles of the Little Wolf River Telephone Company for the past three years. The equipment of the exchanges, though up to date when installed, is out of date, but it is now the property of the Bell Company.

The Independent Companies in Wisconsin were never so strong as they are to-day, as testified by figures from a few of their exchanges, as shown in the accompanying table:

These are but a few of the Independent exchanges in the State. In the above list where the Bell Company has no exchange a toll station only is maintained. There are over 200 prosperous Independent telephone companies in the State, and if the Wisconsin Company thinks it has crippled the situation by securing the properties in the territory of the Little Wolf River Company it will soon wake up to the fact that it has simply relieved the Independent companies of a dead weight and that this same territory will soon be covered by other Independent companies with apparatus of the latest and most efficient design. There will be an exchange in Oshkosh within a year and after Fond du Lac has had the privileges of the monopoly which her subsidized press has been clamoring for for the past few months, she will wake up to the fact that the Little Wolf River Telephone Company, during its three years of existence, saved her citizens, in telephone rentals, the sum of $21,600, and she will be glad for another up-to-date exchange.

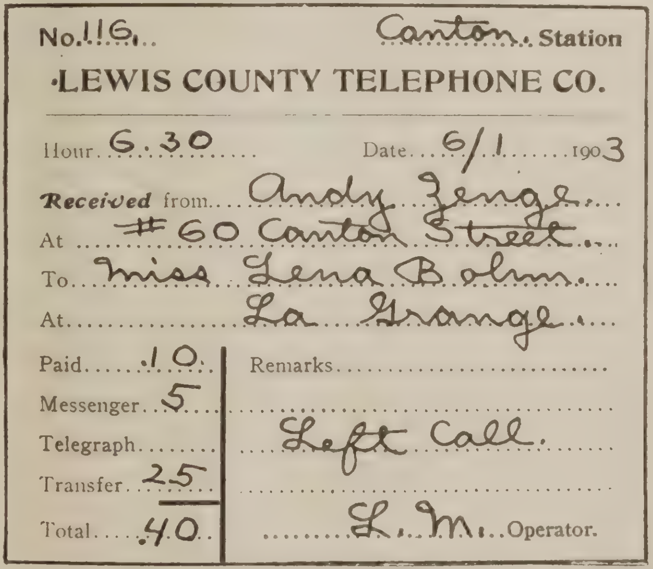
Milwaukee is now of the very few large cities which have not an up-to-date Independent exchange and with an exchange in that city, which is bound to come, the Bell Company of Wisconsin will be crushed as flat as it has been in Michigan.

Respectfully, A. L. HUTCHINSON.

UNIQUE METHOD OF COLLECTING MESSAGE FEES.

(By W. H. ELGES, *Special Correspondent.*)

A METHOD of collecting message fees which appears to be quite effective is used by the Lewis County Telephone Company, of Canton, Mo. The accompanying form is printed on a card and sent to the party with whom the message originated. On the form are provided spaces in which are to be written the name of the station from which the massage was sent, the hour at which it was sent and the name and address of the sender. The name of the party to whom the message was addressed and his address are also given. Room for any remarks is also allowed. The form is filled out by the toll operator who sends it to the proper party.



No. 116 Canton Station

LEWIS COUNTY TELEPHONE CO.

Hour 6.30 Date 6/1 1903

Received from Andy Zenge

At #60 Canton Street

To Miss Lena Bolm

At La Grange

Paid .10 Remarks

Messenger 5

Telegraph Left Call.

Transfer 25

Total 40 L. M. Operator.

AUTOMATIC EXCHANGE FOR DAYTON.

The large exchange of six thousand stations which the Automatic Electric Company is building for the Dayton Home Telephone Company, of Dayton, Ohio, is rapidly nearing completion and it will only be a few weeks before the citizens of Dayton will have automatic telephone service.

The Telephone in the Courts

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

FRANCHISE GIVES NO RIGHT TO TRIM TREES ON PRIVATE PROPERTY.

THE Supreme Court of Texas has decided that a telephone company, operating under a license from city authorities, has no right to enter private property without permission and cut the limbs of trees, although they extend over the sidewalk and interfere with the company's wires. The case was that of the Southwestern Telegraph & Telephone Company vs. F. M. Branham, brought by the latter to recover the value of two shade trees destroyed by the company's employees. The company by virtue of a grant from the city of Terrell, erected poles and strung its wires along the edge of the sidewalk in the public street of the city, and in front of the premises of Branham which abutted on said street. The latter had growing on his premises and within his yard two large shade trees, the branches of which extended over the sidewalk and came in contact with the company's wires. During the years 1901 and 1902, the employees of the company, without the consent of Branham and in spite of his protest, entered his premises, climbed his trees with climbers and trimmed some of the branches, which caused the trees to wither and die. Such were the plaintiff's allegations.

The contention of the company was that "the defendant company, having acquired the right from the municipality of Terrell to construct, operate and maintain its lines of wires and poles along, upon and over the streets of said city for the purpose of maintaining a telephone system in the service of the public, would have the right in the exercise of ordinary care to remove all developing or growing limbs of trees, which had by such growth come in contact with its wires so as to interfere with or destroy the purpose for which such wires were constructed and to be used." In its decision the court said that without entering into a discussion of the respective rights of abutting property owners and public corporations to the use of sidewalks along a street, it would confine itself to the mere statement that the company had no right to enter the premises of the plaintiff without his consent and injure his trees in the manner shown by the evidence without being responsible in damages for so doing. The following decisions were cited: Telegraph & Telephone Co. v. Kennedy 80, Tex. 71; Telephone Company v. Hunt, 1 S. W. 159, 57 Am. Rep. 237. The decision of the lower court was affirmed.

A LAW SUIT TO COMPEL GOOD SERVICE.

IN the absence of competition, the people have to resort to law suits to secure good telephone service. Sometimes competition is not enough, and legal action in addition is needed. A suit, indirectly for that purpose and directly for the purpose of obtaining damages for poor service was that of Dr. T. S. Burbank, of Wilmington, N. C., against the Southern Bell Telephone & Telegraph Company. The plaintiff alleged that on account of the poor service of the system several of his patients were unable to call him, and as a consequence employed other physicians. He also charged that the company removed the telephones from his residence and refused to reinstall them. The telephone company contended that Dr. Burbank ordered his telephones removed by saying that "if the company cannot give better service it can take them out." After the suit was commenced the plaintiff's attorneys submitted to a judgment of non-suit because the court intimated that under the declaration only actual and not punitive damages could be obtained. It is the intention of the plaintiff to file a new declaration and begin suit anew. Five thousand dollars was the amount asked for.

AN ADMIRABLE PENNSYLVANIA LAW.

A LAW was passed at the last session of the Pennsylvania legislature which gives the telephone companies of the state a chance to save thousands of dollars by contracting with other electrical companies for the use of each other's wires. Under the law, arrangements can be made between corporations to have but one system of wiring, entering houses or other places where electric current is used and supplying the current for both the electric light and the telephone. The great economy of such a system is apparent. The law is as follows:

Whereas the multiplying of lines, of poles and conduits and different systems of wires for conducting electricity along the various roads and streets of the commonwealth, is a source of danger and annoyance to the public, and of interference with the proper exercise of municipal functions; therefore,

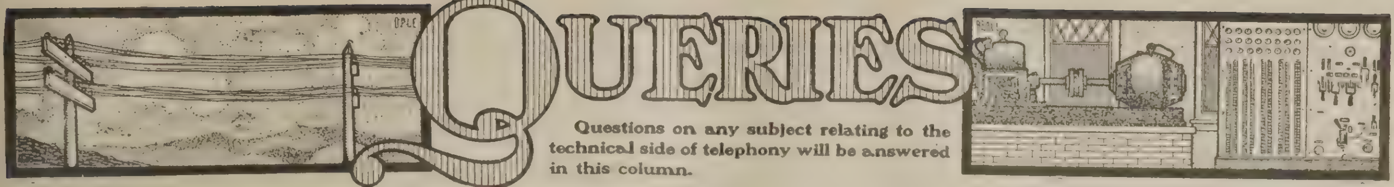
Section 1. Be it enacted, etc. That it shall and may be lawful for corporations, for what purpose soever formed, and lawfully using electrical current within this commonwealth, to enter into contracts with each other for use of the same poles, wires and conduits or for the purchase and sale of electrical current, or for the lease and operation of each other's systems, upon such terms and conditions as they may agree upon.

SALE OF PROPERTY OF TELEPHONE COMPANY PREVENTED BY INJUNCTION.

THE property of the Mutual Telephone Company of Des Moines, Ia., which was recently levied upon by the delinquent tax collector and advertised for sale to satisfy taxes for the years 1900, 1901 and 1902 was not sold as scheduled. An injunction was issued from the circuit court upon application of the Iowa Loan & Trust Company restraining the delinquent tax collector and the county treasurer from proceeding with the sale. The Trust Company, to which the property of the Telephone Company is bonded, contended that the sale was illegal for the reason that if the property of the telephone company, is for the purpose of taxation and the collection of taxes, to be regarded as real property, it can be sold as such only under the laws of the state governing such sales. If the property is to be regarded as personal, then it is covered by the mortgage given to the trust company. The amount of the taxes claimed by the county is $5,000.

NAME IN TELEPHONE BOOK CAUSES A LAW SUIT.

THE Twin City Telephone Company, of Minneapolis, Minn., and Juliet Lang are made defendants in an action brought by Edwin Murray, proprietor of the Murray Institute for the Cure of Inebriates, to recover $500 damages for the use of the institution's name. A permanent injunction is also asked against Miss Lang restraining her from using the name, and against the telephone company restraining it from advertising her as operating such an institution. An order to show cause why the injunction should not be issued has been made. The complaint alleges that Miss Lang wrongfully advertises her institution as the Murray Institute. The telephone company is made a defendant because Miss Lang's name appears in the book in connection with the Murray Institute.



Questions on any subject relating to the technical side of telephony will be answered in this column.

Conducted By WILLIAM W. DEAN

BUSY TEST ON FOUR-PARTY LINE (144).

Will you please straighten me out on the following: In a four party system one subscriber on the line calls central and asks for another subscriber on the same line. If the operator went to plug into the multiple jack of the line would she not get the busy test and tell the persons calling that that subscriber's telephone was busy? J. W. B.—144.

The operating trouble you speak of will occur if the operator does not know that the number called for is on the same line with the calling subscriber. It will occur more frequently where two different numbers are paired together at the exchange as for instance, 175 A and X, and 143 C and Y. If it is found that two parties on the same line call each other frequently, they can be instructed to call as follows: "Give me the C. party on my line," or other letters as requested. If the terminal or unit figure of the number designates the party as "1271-1272-1273 and 1274," meaning the line jack is 127 and the terminal figure 1, 2, 3, or 4 designates the party ring, a system of marking the answering jacks or signals as given below, will overcome the trouble. A good method in exchanges giving party line service is to mark the line signals of all party lines with some distinct mark which the operator cannot fail to see when she answers the call; also place the subscribers number or numbers, if there are two different numbers, on the answering jacks or signals which will show her that the call is from a party-line and give her an opportunity of checking the number called for. It is also well to mark the multiple jack so as to check the operator from ringing with the direct line key if the subscriber fails to give the terminal letter.

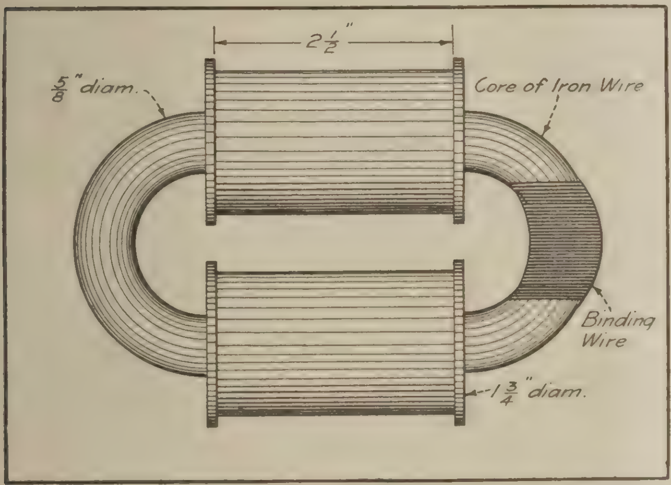


FIG. 145a.

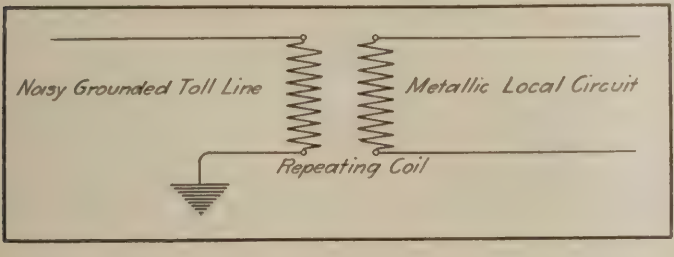


FIG. 148a.

NOISY TOLL LINE (145).

We have a noisy grounded toll line and we want to connect it to our local system through a repeating coil to remove the noise. We understand that a special repeating coil is required when it is to be used both for talking and ringing. Will you please give us specifications for such a coil. G. B.—145.

See Query 148. A coil of about the following dimensions will meet your requirements. Each bobbin to have a coil about 2,500 turns each, of No. 30 single cotton covered wire. The core to be made of a bundle of annealed iron wire about No. 24 gauge forming a closed magnetic circuit through both bobbins. Repeating coils that will meet your requirements can be purchased from any leading manufacturer. Such a coil is illustrated in Fig. 145a. While this coil is suitable for talking and ringing, it will be better to place it in a cord circuit (Fig. 145b.) in place of the line so that when two toll lines are connected together you will not have two repeating coils in the circuit as shown in Fig. 145c. The cord with the repeating coil in circuit can be used either to connect a grounded line to a metallic line, or to connect a grounded or noisy metallic line with another metallic line.

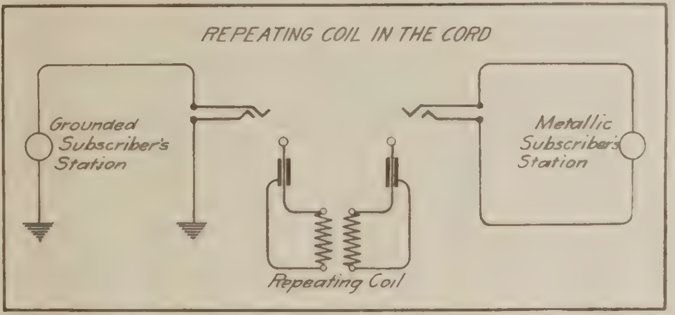

REPEATING COIL IN THE CORD
Grounded Subscriber's Station
Metallic Subscriber's Station
Repeating Coil

FIG. 145b.

ACTION OF REPEATING COIL (148).

Will you please explain through the columns of the JOURNAL why a repeating coil connected as in the diagram will take the noise from the circuit. My idea was that noises on a telephone line were due to currents flowing in the line, and as a repeating coil is a form of induction coil, I should think that any currents flowing through the line winding of the coil, would induce currents to flow in the other winding (*Fig. 148a*). E. B. M.—148.

While the repeating coil connected in the line circuit as you show it, removes the noise, it does so at a corresponding loss of transmission. If you have a ground line which is noisy and connect it with a quiet metallic circuit without using a repeating coil in the circuit, both lines will be noisy. The insertion of the repeating coil will reduce the noise on the metallic line, but not on the ground line. If both lines are noisy the repeating coil will not reduce the noise.

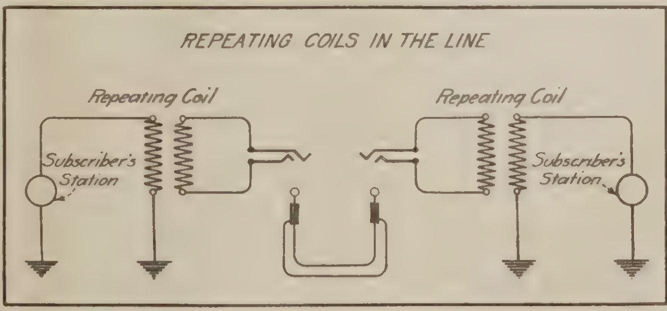


FIG. 145c.

"FRYING" TRANSMITTER (149).

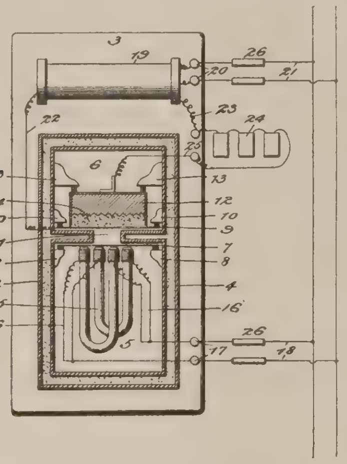
I find that when I connect four dry batteries to my telephone it makes a sizzling sound in the receiver, but when I connect only three it works all right. Can you explain this? W. S. S.—149.

The frying or sizzling noise is due to too much current flowing through the transmitter, two cells of battery are the standard for transmitter circuits.

PATENTS ISSUED

TRANSMITTER AND RECEIVER

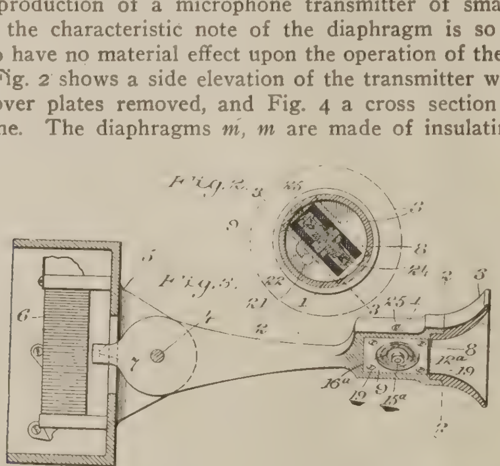
Oliver P. Sammons, of Denison, Texas, patents (No. 732,449) a telephone transmitter and receiver. The object of this invention, which is shown in the figure, is to provide a telephone repeater for long distance lines. The apparatus is mounted upon a base 3, and enclosed in a sound proof casing 4. Located in the box is a receiver 5, and transmitter 6. The diaphragm of the receiver and transmitter are supported on shoulders insulated from the casing, as shown, and acting upon each other through the opening 11. The receiver consists of the permanent magnets and coils shown, and is connected directly to the line. The transmitter is connected in series in a closed circuit with the battery and a primary winding of an induction coil, the secondary winding of the coil being connected directly to the line.



The voice currents pass from the line through the receiver, operating its diaphragm, which in turn operates the transmitter diaphragm, thus repeating and reinforcing the voice currents in the local transmitter circuit and returning them to the line through the secondary circuit.

TELEPHONE TRANSMITTER

Ernest B. Fahnestock, of New York, N. Y., patents (No. 732,284) a telephone transmitter. This invention has for its object the production of a microphone transmitter of small size, in which the characteristic note of the diaphragm is so dampened as to have no material effect upon the operation of the transmitter. Fig. 2 shows a side elevation of the transmitter with one of the cover plates removed, and Fig. 4 a cross section of the microphone. The diaphragms *m*, *m* are made of insulating material and are held with a greater or less degree of rigidity between the disks *r*, *r* and r^1, r^1 by means of the pressure of the nuts m^2, m^2 screwed down upon the threaded bosses r^2.



In this way and by properly adjusting the weight of the nuts m^3 the natural period of vibration of the diaphragm may be reduced, as desired. The interior of the microphone contains carbon granules and its operation offers no unusual features.

SELECTIVE PARTY LINE SYSTEM

Albert J. Springhorn, of Cleveland, Ohio, patents (No. 732,131) a selective party line telephone system. The object of this invention is to provide a selective party line system in which the telephone of the called subscriber alone responds to a signal from the central office, the other instruments on the line being effected only by signals intended for their particular station. The object is accomplished by means of selective dials, at the central office, used in connection with the ringing keys, and by selective dials located at each station which operate in synchronism with the dial at the central office. The arrangement of circuits is such that the connection of any given instrument with the central office serves to disconnect all other instruments from the line and makes it impossible for other instruments to break in on the connection. The dials are operated by a clockwork mechanism located in each dial and are automatically returned to their normal position upon termination of a connection.

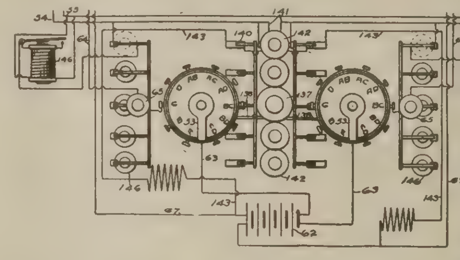


Fig. 16.

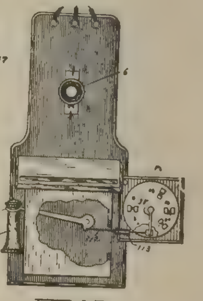


Fig. 12

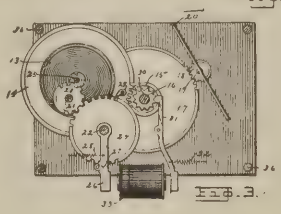


Fig. 3.

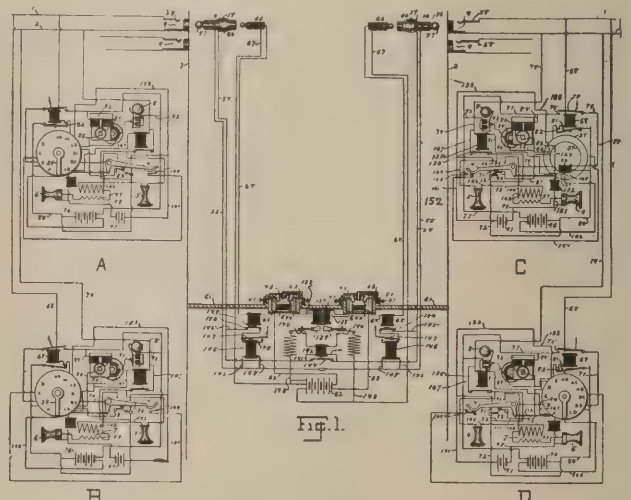


Fig. 1.

In addition to the usual connecting plugs to the switchboard, special selecting plugs are provided which fit in to the connecting plug and are adapted to be removed after the required connection has been established. The arrangement of circuits for this system is shown in Fig. 1, where two party lines are illustrated, each having two instruments in parallel on the line, the cord circuit with the connecting plugs and selective plugs is also shown. Fig. 3 shows the arrangement of the clockwork mechanism for the dials at the subscribers' stations. Fig. 15 shows the mechanism of the selective dial at the central office. Fig. 16 shows a plan view of the arrangement of the selective apparatus in the central office keyboard. Fig. 12 shows a view of a telephone equipped with the selective mechanism.

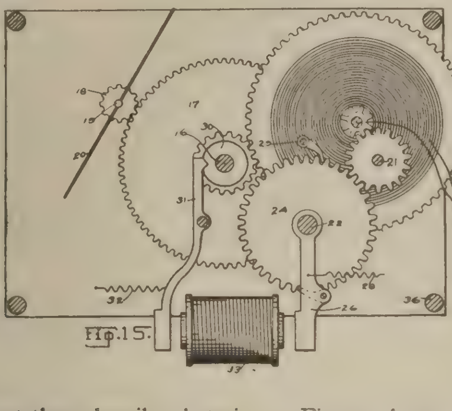


Fig.15.

TELEPHONE.

Ernest Hugo Strauss, of Chicago, Ill., patents (No. 733,296) a telephone. The object of this invention is to guard against shocks, due to the subscribers touching his receiver hook switch or generator crank. The general arrangement of the circuits is shown in Fig. 4. The hook switch is pivoted, as shown in the figure, and is provided with insulated contact lugs, *12* and *12*. These lugs serve to close the ringing and talking branches of the circuit through the contact springs mounted on and insulated from the bracket. The arrangement of contact springs is the usual one. When the receiver is on the hook the ringing circuit is closed. Fig. 2 shows a plan view of the switch, showing the switch spring. The hook itself does not act as a conductor.

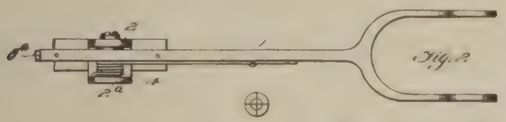


Fig. 2

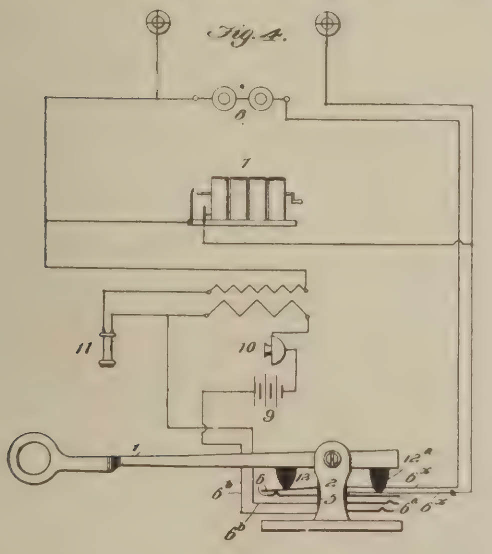


Fig. 4.

SIGNALING DEVICE.

Benjamin O. Fox, of Milwaukee, Wis., patents (No. 733,021) a telephone. The object of this invention, which is shown in Figs. 2 and 3, is to provide an effective means of signalling the central office. The receiver is provided with a spring *B*, to which is attached a strip of insulating material *a*, which extends through the shell of the receiver. The spring *B* is normally in contact with the stud *c*, and thus an alarm circuit for the station is formed through wires *1* and *2*. When the plate *a* is pressed the spring *B* makes contact with spring *C*. This operates the alarm signal at the central station. Further depression of plate *a* causes insulating lug *b* to make contact with spring *C*, forcing it away from and breaking its contact with spring *B*. Spring *B* now makes contact with spring *D* and forms a talking circuit to the central station.

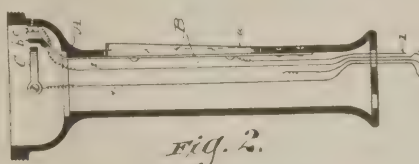


Fig. 2.

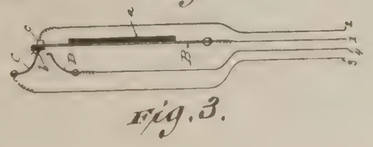


Fig. 3.

TELEPHONE SWITCHBOARD.

Charles E. Egan, of Chicago, Ill., patents (No. 732,931) a telephone switchboard and assigns his patents to the Western Telephone Manufacturing Company. The switchboard, which is shown in Fig. 1, consists of the jacks *A* and drops, which are mounted on the face of the board, as shown in Fig. 3. The arms *C* and *D* are mounted one on either side of the jack, as shown, the arm *D* acting as a ringing key to signal the connected stations *K, K, K*. The arm *C* acts as a listening key. The wiring of the instruments, operators' telephones and calling generator is clearly shown in Fig. 1. Fig. 2 shows a cross-section through a drop and jack, showing the method of fastening the drops and jacks to the switchboard by means of the screw A^2.

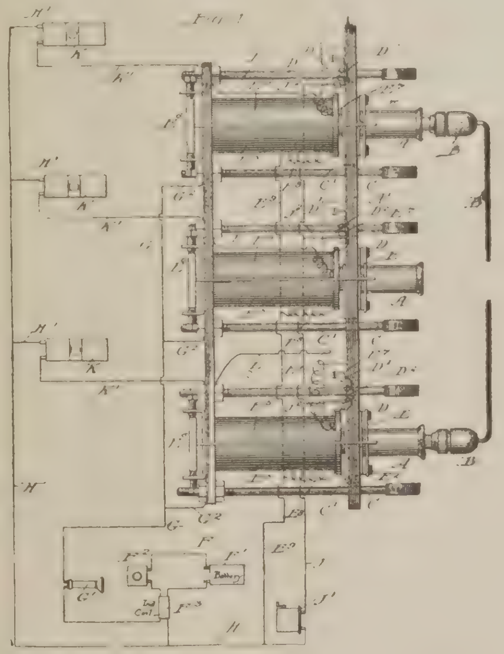


Fig. 1

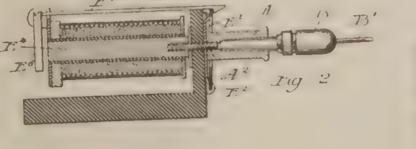


Fig 2

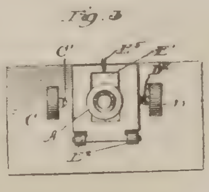


Fig. 3

The Week's Messages.

FINANCIAL

EAST HAVEN, CONN.—The East Haven Telephone and Electric Company has increased its capital stock from $1,000 to $3,000.

PEKIN, ILL.—The Citizens' Telephone Company has increased its capital stock from $50,000 to $200,000.

ROCK ISLAND, ILL.—The stockholders of the new Independent Union Telephone Company have voted unanimously to authorize the issue and sale of $150,000 additional stock, the proceeds of part of which will be spent in extending the present plant in the tri-cities. Two exchanges have almost reached their switchboard capacity, although they have been in operation less than five months. The company's service will also be extended throughout Scott County, Rock Island County, and adjoining counties at an early date, active construction on them probably beginning during next month.

ST. LOUIS, MO.—The Central Telephone and Electric Company, of St. Louis, has filed articles to show that it has made an increase in its capital stock from $10,000 to $50,000. Assets, $77,669.31; liabilities, $25,459.21.

WARWICK, N. Y.—The Warwick Valley Telephone Company has paid a dividend of 2½ per cent. on its stock.

DAYTON, OHIO.—The board of directors of the Home Telephone Company held their regular monthly meeting in this city, at which a 6 per cent. dividend on the preferred stock was declared. The company has rebuilt its Joplin system throughout.

WOODSFIELD, OHIO.—The Woodsfield Telephone Company has been authorized to increase its capital stock from $10,000 to $15,000.

PHILADELPHIA, PA.—Keystone Telephone's net earnings last month were $21,434, an increase of about $3,000 over May.

SALT LAKE CITY, UTAH.—The Utah Independent Home Telephone Company has filed its bonds of $35,000 with the City Recorder and paid the first $1,000 of street rental.

FRANCHISES

CORONA, CAL.—The city trustees have opened bids for the sale of the telephone franchise applied for by the Home Company. It was sold to W. M. Niebel, of Long Beach, for $129. The money was paid and bond filed and accepted.

DIXON, ILL.—The Lee County Telephone Company, of which L. D. Pitcher is president and general manager, has been granted a 20-year franchise to operate in this city.

RENSSELAER, IND.—The Independent Telephone Company has been granted a franchise to establish a toll station at Goodland.

DES MOINES, IA.—Mayor James M. Brenton will, it is said, veto the Mutual Telephone repealing ordinance. It is understood that the Mayor in his veto will say that the city has no right to present the Mutual Telephone Company the $10,000 which is due on franchise royalty. It is also understood that the Mayor will recommend that the Council, in the interest of reasonable telephone rates in Des Moines, pass an ordinance regulating the maximum rate which the company may charge. The Mayor also favors the control by the city of the toll line companies which enter the city over the Mutual Telephone poles.

LEWISTON, ME.—The Lewiston & Auburn Telephone Company has petitioned the City Council for permission to lay conduits for wires and to erect poles.

ELECTIONS

LAWRENCEVILLE, ILL.—The stockholders of the newly organized Citizens' Telephone Company of Lawrence County have elected the following board of directors: C. B. Jones and G. W. Hill, of Sumner; Arthur W. Johnson and Will J. Warner, of Allison; T. J. Pinkstaff and A. R. Applegate, of Pinkstaff; Scott Cluxton, of St. Francisville; Dr. J. E. Connett and H. W. Hostettler, of Lawrenceville. The board of directors organized by electing C. B. Jones, president; Arthur W. Johnson, vice-president, and Scott Cluxton, secretary. H. W. Hostettler was employed as manager. The property of the Lawrence County Telephone Company will be purchased.

TABOR, IA.—The Tabor Telephone Company has re-elected S. Rhoades of Randolph, president and general manager; A. A. Falling, of Tabor, secretary and treasurer.

NORTH BARNSTEAD, N. H.—The Union Telephone Company, of Barnstead, which filed articles of incorporation with the Secretary of State a short time ago has chosen the following directors: William H. Berry, Charles E. Rand, Charles W. Evans, Arthur T. Pendergast, and George W. Dow. At the directors' meeting, Charles E. Rand was elected president; Arthur T. Pendergast, treasurer, and George W. Dow, secretary. This line is to run from Barnstead Center to Farmington via North Barnstead and Dexter (New Burham).

EASTON, N. Y.—At a meeting of the Telephone Company recently F. O. Ives resigned the presidency, and Howard Slocum was elected. Allen Buckley and Howard Slocum were appointed a committee to negotiate with Thomas J. Eldredge for the use of his poles in the continuation of the line from Easton to Greenwich.

PENN YAN, N. Y.—The annual meeting of the Crosby and Barrington Telephone Company was held at the residence of Isaac Crosby, in Barrington. The following directors were elected for the ensuing year: Charles E. Guile, Herbert C. Ovenshire, Howard Fullager, T. W. Windnagle, Samuel I. Thayre, Steven Rector and Isaac Crosby. The following officers were chosen: President, C. E. Guile; vice-president, Howard Fullagher; secretary and treasurer, Herbert C. Ovenshire.

BEDFORD, PA.—The stockholders of the Bedford County Telephone Company held their annual meeting at the office of the company at Fishertown recently. Elias Blackburn, A. C. Blackburn, Scott U. Hammer, Ed. D. Heckerman and Henry Wisegarver were elected directors for the ensuing year. The board of directors organized by re-electing Elias Blackburn, president; Ed. D. Heckerman, secretary, and A. C. Blackburn, treasurer. An increase of capital stock to the amount of $15,000.00 was provided for.

MERRITTSTOWN, PA.—The annual meeting of the stockholders of the Monongahela Valley Telephone Company was held in Merrittstown. The treasurer's report showed a balance of $947.50. The following directors were elected for the ensuing year: Jas. W. Dunaway, president; L. F. Arensburg, vice-president; Samuel E. Taylor, treasurer; A. L. Gilmore, secretary, J. R. Vankirk, O. J. Garwood and R. H. Acklin. The first work of the new board will be to make arrangements to connect with the Tri-State, thereby securing a direct line to Uniontown.

TYLER, TEXAS.—The regular annual meeting of the Globe Telephone Company (long distance line) was held recently, all the old officers being re-elected as follows: President and general manager, S. F. Richardson; vice-president, James R. Adams; secretary and auditor, E. D. Johnston; treasurer, James T. Harris; directors, S. F. Richardson, J. R. Adams, J. T. Harris, C. C. Crews and J. B. Cave. The report showed the company had completed over 115 miles of first class metallic toll lines with all stations working and business increasing very favorably. This line runs through the famous east Texas fruit belt and the company is well equipped to handle the vast business incidental to the moving of that commodity. The lines will be increased and extended from time to time.

TYLER, TEXAS.—The regular annual meeting of the Tyler Telephone Company was held recently: All the old officers were elected as follows: S. F. Richardson, president and treasurer; M. D. Shaw, secretary; E. D. Johnston, assistant manager. The following directors were elected: S. F. Richardson, M. D. Shaw, James S. Brailey, C. D. Crites, Walter B. Richie, J. R. Adams and C. C. Crews. The annual report shows the company to be in a good healthy condition, with an increase of patronage. The subscripscription list is now about 50 per cent. greater than that of the Bell.

SUNNYSIDE, WASH.—The annual meeting of the stockholders of the

THE WEEK'S MESSAGES—Concluded

Christian Co-operative Telephone Association was held here. S. J. Harrison, president, and R. D. Young, secretary and treasurer of the old board, were re-elected. M. H. Gilbert, of North Yakima, N. Woodin and Dr. Harvey, of Sunnyside, are the new members of the board. Captain Dunn, of Parker Bottom, urged the completion of the line to North Yakima at the earliest possible date. The line now extends from Prosser to Simcoe via Mabton, Sunnyside, Outlook, Zillah, Toppenish and Parker. A resolution was passed to advance the price of stock from $50 to $100 per share. This association furnishes subscribers telephone service at actual cost. There are now 141 telephones in the system.

COMBINATIONS

GRAND RAPIDS, MICH.—The Independent telephone exchange at Dimondale has been purchased by the Citizens' Telephone Company of Grand Rapids.

GERMANTOWN, OHIO.—The Independent Telephone Company has purchased the Bailey & Flinspach line.

PERSONAL.

DIXON, ILL.—L. D. Pitcher, president and general manager of the Lee County Telephone Company has been allowed a patent on an improved screw guy anchor which is said to be an improvement on anything of the kind in the market. The anchor when placed in its position does not displace the ground or sod and may be used in rocky or stony ground, and when started will draw itself into the ground, twist a double guy wire and pull it tight without blocks. When the anchor is set it is locked in place by driving into the ground the small bar of iron which was used to turn it.

MINNEAPOLIS, MINN.—C. H. Judson, the retiring general superintendent of the Twin City Telephone Company, has been presented with a splendid token of good will by the employes of the company in the shape of a beautiful bronze figure, which has been named "Goddess Independence," significant of the Independent telephone business. The presentation was made by Capt. F. B. Kidder, who told Mr. Judson the regret the employes of the company felt at his departure for Kansas City. Mr. Judson made a happy reply. Some 250 persons, including telephone operators, linemen and inspectors, each contributed toward the gift.

LA RUE, OHIO.—Gerald Clark, who recently took the management of the LaRue Telephone Company, which operates under the Marion County Company, is making a great success of his work. The lockout system is employed in the country around LaRue, by which all telephones but the one in use are locked off the line. The system of conducting the office affairs in La Rue has been much bettered by Mr. Clark, and he has secured a large number of new subscribers.

GOSHEN, N. Y.—Linley H. Yerg has been made manager of the Orange County Telephone Company's branch exchange in this village.

OBITUARY

ABILENE, KAN., July 3.—J. J. McCullough, manager of the Herington telephone exchange, fell from a telephone pole whle fixing wires. His arms were torn and he died of his injuries.

UNDERGROUND

CLINTON, IA.—The Tri-City Telephone Company will install an underground system.

MISCELLANEOUS

CHICAGO, ILL.—During June the Chicago Telephone Company installed 2,649 new instruments, according to the *Boston Financial News*, practically all of which are said to represent new subscribers. The company now holds in service in this city more than 60,000 telephones.

COLFAX, IND.—The Peoples' District Telephone Company held their semi-annual meeting in Colfax and discussed matters pertaining to the general welfare and improvement of co-operative systems. There are about twenty local companies in the district and most of them were represented by delegates. The following delegates were in attendance: Silas Bowers, Darlington; Harvy Hoover, Thorntown; J. M. Zion, Clarkshill; M. C. Cann, Stockwell; George Barnett, Kirklin; Samuel Ayers, Manson; Louis Kirk, Bowers; Dr. L. S. Baugh, South Raub, and G. T. Burk, Colfax. Samuel Flanagan, of Bowers, president of the association, presided at the meeting. Representatives from New Richmond and from several new companies were present and as a result the membership will be largely increased.

SALT LAKE CITY, UTAH.—The Independent Home Telephone Company is making an effort to get permission from the city authorities to place its poles along the edge of the streets instead of in the center.

New Construction in the Field

PASADENA, CAL.—The Home Telephone Company has secured a contract for equipping the Hotel Green with 600 telephones, one for every room. A large switchboard will be placed in the building.

SANTA ANA, CAL.—Amended articles of incorporation of the Home Telephone Company, filed with the County Clerk recite that the capital stock of the concern is $100,000, of which $10,000 has been subscribed. Telephone lines, with the latest devices for the successful transmission of messages are to be constructed from this city to Los Angeles, via Orange, Anaheim and Fullerton; also to San Diego, Long Beach, Newport Beach, Riverside and other places. The directors of the concern are F. F. Graves, John Van Liew, F. W. Wachter, Charles L. Zahn, and Arthur Wright, all of Los Angeles.

ATLANTA, GA.—The new switchboard of the Standard Telephone Company is completed and in working order, giving service to about 4,000 subscribers.

COVINGTON, GA.—C. C. Brooks, president of the Covington Telephone Company, will build a long distance line from here to Atlanta. Mr. Brooks takes one-half of the stock and the Standard Telephone Company, of Atlanta, takes the other half.

NASHVILLE, ILL.—The Southern Union Telephone Company of this city has completed its line between this city and Addieville, and will soon have direct communication with Okawville.

OTTAWA, ILL.—The Home Telephone Company is building a new exchange at Utica. Free service between Ottawa and Utica will be given.

MARION, IND.—The United Telephone Company will put in a line to Weaver.

MT. VERNON, IND.—Mr. W. A. McGregor, manager of the Posey County Telephone Company, is pushing the work of construction. He has placed orders for three carloads of poles, also orders for telephones, wire, etc.

NEW ALBANY, IND.—The Home Telephone Company has completed connections with a number of the important cities in the western and northern part of the State. Among the cities now having long distance connection with the Home Company are Indianapolis, Anderson, Lafayette, Terre Haute and Vincennes. All intermediate points having telephone exchanges between New Albany and the cities mentioned will also be connected with this new long distance system.

PURCELLS, IND.—The Knox County Telephone Company, of Vincinnes, Ind., has extended its lines to this place.

SULLIVAN, IND.—The Sullivan Telephone Company, represented by Manager Marion Shade and the Vincennes (Ind.), Telephone Company, represented by Manager Vollmer, endeavored to get a franchise last week from the Carlisle town board for a right of way for their lines through Carlisle. Their request was refused and the managers of the two companies bought a right of way around Carlisle and connected the lines between Sullivan and Vincennes. Oaktown has joined the Independent system, and will be on the Vincennes-Sullivan line.

VINCENNES, IND.—A telephone service has been established between Vincennes and Alice by way of Decker. James Sisson is manager at Alice. This connection puts the southwestern part of Knox County in communication with the other.

TULSA, I. T.—Mr. Ellis, the manager of the Indian Territory Long Distance Telephone Company, is in the city to substitute an improved system for the one now in use here. The lines will be repaired and fifty new telephones added. Eugene Turner will be succeeded in the management of the Tulsa exchange by Arthur Warner of Muskogee.

LARNED, KAN.—The Larned Telephone Company recently installed a station at the Old Ford Larned ranch, now owned by E. E. Frizell. The ranch is about eight miles west of Larned.

LEWISTON, ME.—The Northeastern Telephone Company will run into Lewiston this summer, said B. N. Lewis, the local manager of the exchange in Lisbon Falls.

BATAVIA, MICH.—The Himebaugh Telephone Company will soon continue the line from Batavia village into Bethel.

GRAND RAPIDS, MICH.—Manager C. E. Tarte and Superintendent of Construction Albert Stacey, of the Citizens' Telephone Company, have returned from a trip north, and as a result a line will be established between Traverse City and Old Mission, which will be both for toll and local purposes.

THE WEEK'S MESSAGES—Concluded.

OSAKIS, MINN.—The Leslie Rural Telephone Company has its wire strung from Osakis to Long Prairie.

HANNIBAL, MO.—The Bluff City Telephone Company has decided to increase its stock, and will lay a cable across the Mississippi River at Hannibal to connect with Illinois lines.

MILLIGAN, NEB.—Manager John Barbsy, of the Fillmore County Telephone Company, says the company will open its Milligan exchange in about a week.

MANCHESTER, N. H.—The Citizens' Telephone Company will extend its line about one and a half miles from Hill.

BAITING HOLLOW, N. Y.—The Baiting Hollow and Roanoke Telephone Company has completed stringing 100 miles of wire and is now placing in position the instruments of a large number of subscribers. The new central station in Riverhead is open. The company has over 150 instruments in use.

DELHI, N. Y.—The Andes and Delhi Telephone Company is extending the line to Weaver Hollow.

DELHI, N. Y.—A farmers' telephone line is being built between Delhi and Hamden.

TRADE NOTES

F. C. MOTT, formerly associated with Mr. G. M. Gest, has been placed in charge of the eastern interests of the American Conduit Company, manufacturers of the electrolysis proof bituminized fiber conduit. A New York office has recently been opened, of which Mr. Mott is manager. This is in addition to offices in Philadelphia, Chicago and Los Angeles. The demand for conduit during the past year has necessitated the opening of this office.

THE EUREKA ELECTRIC COMPANY on July 4 dedicated its new factory at Genoa, Ill. Dedicatory exercises were held in the afternoon at which I. J. Kusel, president of the Eureka Company, made an address and Mrs. I. J. Kusel, assisted by six young ladies, christened the new factory by the breaking of a bottle of Genoa's artesian water. In the evening a ball was given in the new factory building, to which many invitations had been issued. A goodly number responded, and the festivities did not cease until an early hour.

THE BRIDGEPORT BRASS COMPANY has recently been awarded large contracts for several miles of phono electric wire for shipment to Europe. This wire is to be used on the Glasgow Traction System, and also on the Dublin United Tramways, another large electric system. It will require about ten miles of wire for the Glasgow system. Negotiations are well along on proposed contracts for "phono" wire to be used on some of the big traction systems on the Continent, and it is expected these will be given shortly.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, of Chicago, Ill., and Rochester, N. Y., has recently sold a special type dispatcher's desk, with telephones, to the Interurban Railway & Terminal Co., of Cincinnati, O. This company has also recently closed contracts for switchboards for the following companies: Adena Telephone Company, Adena, O.; Vigilant Telephone Company, Dillonville, O.; Morrow County Telephone Company, Mt. Gilead, O.; also a large number of telephones to the last named company.

THE SWEDISH-AMERICAN TELEPHONE COMPANY has recently furnished complete exchange equipment for the following named Independent telephone organizations: The Ney Telephone Co., Ney, Ohio; the Potosi Telephone Co., Potosi, Mo.; the Palo Telephone Co., Palo, Mich.; the Idaville Mutual Telephone Co., Idaville, Ind.; the Illiopolis Telephone Co., Illiopolis, Ill. This company announces the prospect for business was never better, and that it does not anticipate the slump in business that is usual during the summer months.

THE CALCULAGRAPH COMPANY, of 9, 11 and 13 Maiden Lane, New York City, announces that recently Judge Hale, of the United States Circuit Court, Boston, granted it a preliminary injunction against John C. Wilson, doing business as the Automatic Time Stamp Company, and restraining him from the manufacture and sale of an instrument for measuring and recording time called "The Timometer." The infringements were claimed on patents Nos. 424,291 and 583,320, which are owned by the Calculagraph Company.

THE EUREKA ELECTRIC COMPANY of Genoa and Chicago, Illinois, has recently supplied the Hoosier Telephone Company at Salem, Ind., with a 300-line switchboard of their new bell style ring down type. This company is making a specialty of this style of board, and anticipates a very large sale for it, as it is remarkably simple in construction and operation, and combines many desirable features. The company has completed its new factory at Genoa, Ill., which gives it three times its former capacity, and from the present outlook, claims that it will be necessary to enlarge the factory before a year elapses.

G. M. GEST, EXPERT SUBWAY CONTRACTOR, of Cincinnati, O., and New York, has invented and is placing on the market a new cable bracket frame which he calls "The Gest Bracket Frame." It is made of angle iron heavily galvanized and supplied at top and bottom with anchors, which, with the frame itself, are built into the wall. The face of the frame is flush with the wall, thereby taking up no room in the manhole.

The cable bracket (galvanized cast iron) is secured to the frame by means of a galvanized T-head bolt with a special nut, which is so designed that the bracket is removable by being lifted vertically upward. By means of the special nut the bracket can be adjusted to any angle and as the slot in the frame is unobstructed from the top to the bottom, the bracket can be adjusted to any desired height. The frames are made in the following lengths, 12 inches, 24 inches, 30 inches, 36 inches, and 42 inches. The brackets are made in three sizes, single, double and triple. Longer frames than those given are made to special order. The brackets and bolts are easily removable and very little time is required to change from a single bracket to one of the double or triple types. All parts are heavily galvanized and will last as long as the conduit system itself.

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The American Telephone Journal

VOLUME VIII *SATURDAY, JULY 25, 1903* *NUMBER 4*

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STEPS IN THE EVOLUTION OF CIRCUIT DESIGN

ARTICLE XV—INSTRUMENT CUT-OVER, LOCAL TO COMMON BATTERY

By J. C. Kelsey.

THE process of changing to a new common battery exchange means a busy season. For several months prior to the completion of the new system preparations are made, not only relating to the lines, but to the instruments, which on one day must operate satisfactorily on local battery and on the day following must operate on common battery. Cut-overs usually are made at night, though there are cases of day cut-overs, which have been successful, but it is safe to say that such exchanges are not very busy.

The first step, other than rebuilding lines, which is not at present vital, is the arrangement of the local battery instruments which will allow them to operate on both systems. Probably there are both series and bridging instruments, and the treatment of them is somewhat different because one is less sensitive than the other. For common battery work a condenser is placed in the circuit in series with the ringer, so that when the receiver is on the hook continuous currents cannot flow, but the condenser will permit alternating currents to pass. In Fig. 102 a series bell is shown. The ringers are of low resistance, are not sensitive and take a large amount of current to operate them satisfactorily. If, according to Fig. 103, a condenser is placed at *K*, a new resistance has been added to the ringing circuit—say, about five thousand ohms to the ringing frequency of 20 cycles. The operator rings on the line, but the instrument man finds that with all his efforts to adjust, he cannot succeed in making the bell ring well. The course to pursue is to add one more condenser in parallel with the first, and then the ringer will receive enough current to ring the bell satisfactorily.

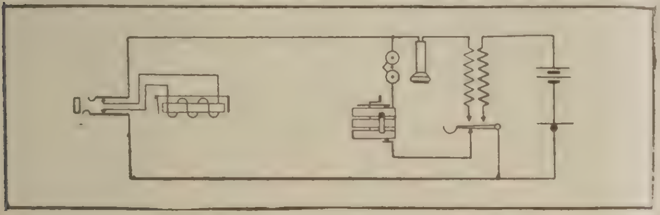


FIG. 102.

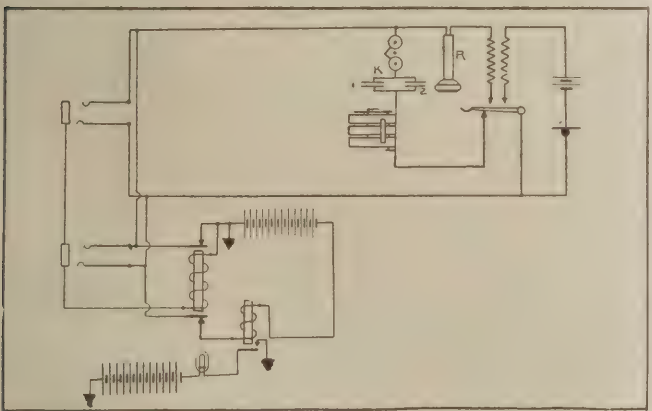


FIG. 104.

As the bridging bell has higher wound coils and is far more sensitive, the addition of a condenser to the circuit will in nowise affect the loudness of the bell. As the magneto generator is normally open, the condenser is placed at *K*, directly in the ringing circuit (Fig. 105).

The day following cut-over, there will be a furious buzzing of relays and all kinds of queer relay actions, because the subscribers still have the generator habit; for, even after they have been informed, it is hard to break down habits of years' standing. So the next thing is to remove the generator handles, thereby making the local battery telephone common battery instruments, according to Figs. 104 and 105.

A new trouble asserts itself, relating to the polarity of the receiver with reference to the common battery current. If it does not correspond, hearing will be impaired; but if it does, then the hearing will be improved. Even if properly poled, there is no guarantee of permanency, because the line crew may cut in a transposition and reverse the polarity. The circuit of the early common battery instrument, according to Fig. 106, looks a great deal like that of the local battery. The receiver is in the same place, the induction coil with primary and secondary in the same position and the transmitter moved around in the loop in the exchange battery path. The condenser has apparently taken the place of the local battery. The bell is still bridged, but is differently placed, where it can be in series with the condenser and still allow the condenser to be used in the talking circuit. This style is used in a great many common battery systems, and it gives satisfaction. It uses less current than the one following, but a danger of opposition of polarity is apparent. And an opposition of polarity is dertimental to best service. This style of instrument is in use by many Bell licensees and is called the No. 49 bell.

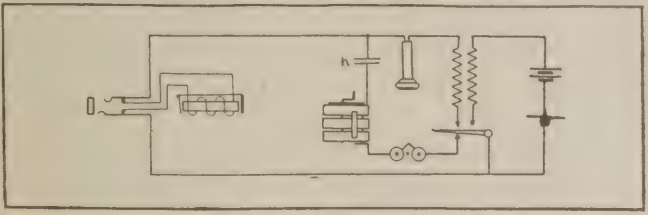


FIG. 103.

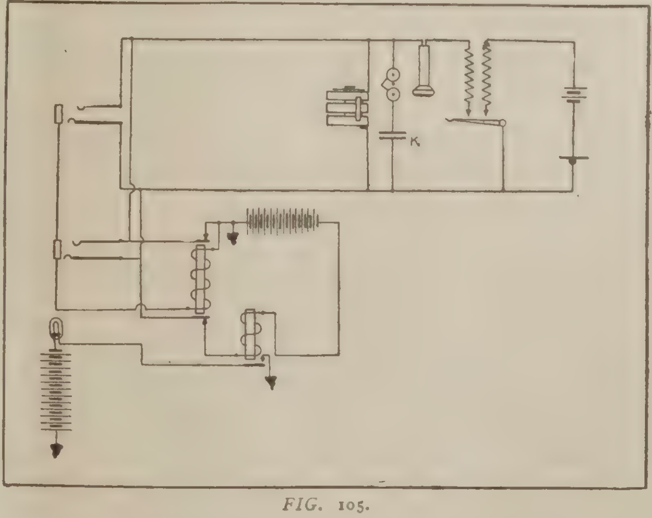


FIG. 105.

The next instrument (Fig. 107) in use by the majority of licensees is called No. 68, or No. 85, and is a late modification of the previous instrument. The wiring is according to Fig. 6. The receiver is in the primary circuit and removed from the transmitter circuit, so that the waves from the transmitter will not be retarded in any manner by the receiver. The receiver at all times is in inductive relation and not in conductive relation to the talking circuit. The use of this instrument causes an increase in the battery output by the removal of eighty ohms to the primary circuit. But polarity opposition is prevented and the instrument, when once set up, is likely to need little attention. There seems to be a general misunderstanding of this style of instrument. Most men assume that the condenser is placed in the instrument circuit for the sole purpose of opening the circuit to a continuous current. This is a mistake, and causes many who use extension desk telephones to complain that they cannot get good service. They find that the telephone which is the original installation gives them superior service. Why? Because the instrument man has said to himself: "This extension telephone does not need a ringer, and therefore it does not need a condenser." As a result, when one uses such a telephone, he tries to talk over a muffled and even drummy instrument. He cannot hear well, nor can anyone hear him. Why? Without the condenser the telephone has lost, let us say, its elasticity and buoyancy. It is a half-dead telephone. His extension desk telephone does need a condenser, as the following paragraph will explain:

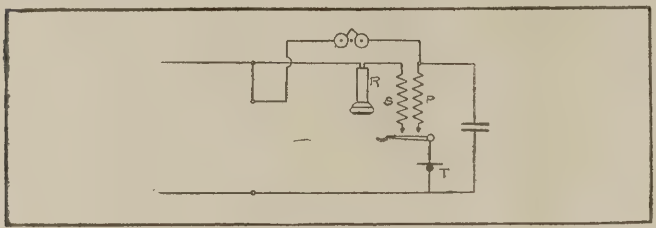


FIG. 106.

Mr. Dean has given such an excellent explanation of this condenser action on page 357 of THE AMERICAN TELEPHONE JOURNAL that the author is glad to quote therefrom for the benefit of his readers:

"This circuit is in Fig. 108 drawn as it is actually connected. The secondary coil of the induction coil *S* measures 17 ohms, and has 1,700 convolutions of wire; the primary circuit *P* measures 30 ohms and has 1,400 convolutions of wire. The ends of the primary and secondary coils, marked *o*, are the outside ends and the ones marked *i* are inside ends; both coils are wound in the same direction on the core. The action of this circuit is as follows: Suppose the transmitter *T* is at rest and has a certain fixed resistance. Current will flow from the positive side of the battery over the line through the secondary winding of the induction coil in the direction of the arrow No. 1, through the hook contact, transmitter *T*, to the other side of the line, to the negative side of the battery. Between the points *x* and *y* there will be a certain electrical potential, the condenser *C* will be charged to the same potential that exists between the points *x* and *y* and the direction of this charge will be as indicated in the sketch. In speaking into the transmitter *T*, a sudden lowering of its resistance is caused. The potential between the points *x* and *y* will be reduced; in other words, it will be lower than the charge existing in the condenser *C*. A discharge will now take place from the condenser through the primary *P* of the induction coil, through the receiver *R*, the hook, the transmitter *T* to the negative side of the condenser. This discharge of current will be in the direction indicated by arrow No. 2. The flow of the current through the primary *P*, as indicated, will cause a current to be induced in the secondary winding *S*, in the direction of the arrow No. 3. This current, on account of the 'step up' effect of the induction coil, will be of a higher potential than the original current and, as it is in the same direction as the current indicated by arrow No. 1, will augment it. When the transmitter *T* returns to its normal position, the potential will be again raised between the points *x* and *y*. Current will, therefore, flow into the condenser from the point *y* through the hook to receiver *R*, through the primary winding *P* in a direction opposed to arrow No. 2, to condenser *C* to the point *x*. An induced current will be generated in the secondary *S*, in a direction opposed to arrow No. 3. This current will oppose the main line current flowing in the direction of arrow No. 1, but on account of the increase in resistance of the transmitter *T*, this current is on the decrease, and the last mentioned induced current will still further tend to decrease it. It will thus be seen that the current changes taking place in the telephone line are of much greater range than they would be if induction coil were not used."

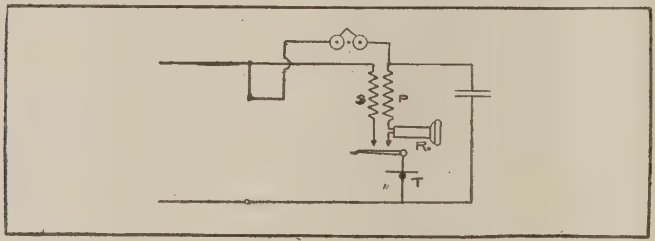


FIG. 107.

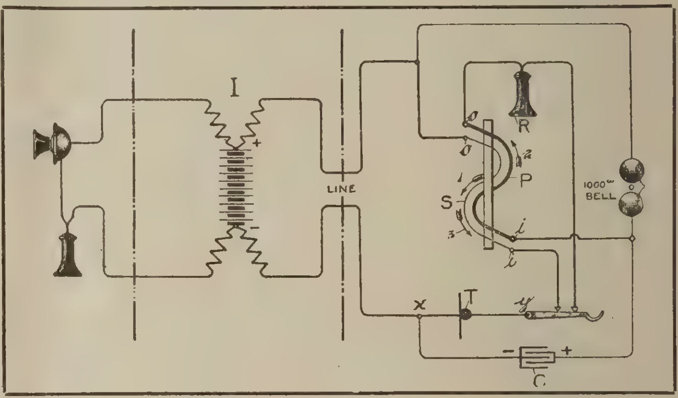


FIG. 108.

"In order to prove that the action of the coil augments the transmission, connect a switch so that the terminals of the secondary coil can be instantaneously reversed, or, in other words, change the relative positions of the points *o* and *i* of the coil *S*, and a difference in volume of transmission of about 50 per cent. will be noticed."

YELLOW HAMMERS MAKE TROUBLE FOR TELEPHONE COMPANIES

OWING to the ravages of the yellow hammers, or flickers, in the vicinity of East Eddington, Me., workmen have been kept busy repairing and replacing poles on the new telephone line ever since the birds came north in the spring.

Until the white cedar or arbor vitæ poles were employed to support the wires the flickers did not disturb them.

No sooner, however, had the cedar trees been felled and set up along the sides of the roads to support the wires than every pole became the target for industrious birds which not only dug holes for their nests in the soft trunks, but tunneled the wood in every direction.

Men who have observed flickers at work on the telephone poles say that the birds mistake the constant humming of the wires for the sounds of insects in the wood, and that the poles are ruined out of misdirected zeal in pursuit of grubs which do not exist. A flicker alighting on the side of a pole will give a few taps with his bill against the dry wood and then cock his head to one side to listen for borers. Hearing the wires singing and humming in the breeze and feeling the pole trembling slightly from the pulsing sound, the flicker reasons that the whole stick is filled with toothsome grubs and at once begins to cut away the wood.

After working until tired, the bird stops to listen and finding that the sound is as loud as before and apparently deeper in the wood, he resumes his labor, penetrating farther and farther, until he has bored a hole clear through the stick. In this manner the flickers have worked day after day until there is not a perfect pole left on any telephone line which runs through the woods. As a new pole is worth $3, and as the cost of cartage and setting is $2 more, the expense of keeping a backwoods line in repair is more than the companies can afford and double rates are charged to patrons who desire telephone communication from resorts that are far from open fields.

ELECTRICAL MEASUREMENTS

ARTICLE XVI.—THE OHMMETER

By Arthur Vaughan Abbott.

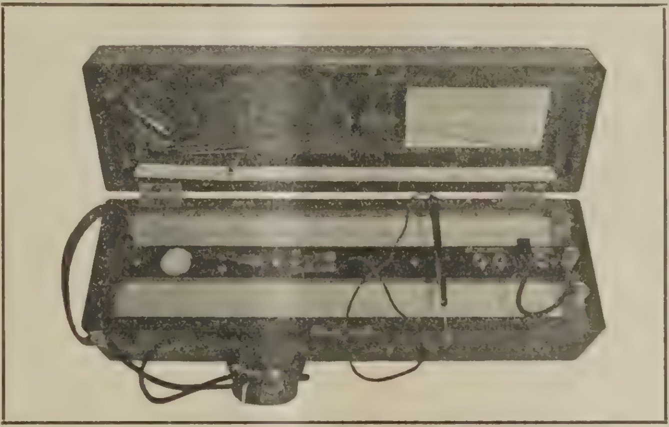


FIG. 1.

A VERY ingenious testing instrument based upon the principles of the Wheatstone Bridge, or a modification thereof, has recently been placed upon the market under the name of the Ohnmeter. Strictly speaking, the word "Ohnmeter" means a resistance measurer, and although the present instrument is well adapted to make measurements of resistance it has, as will presently be explained, the ability to measure inductance and capacity with greater ease and celerity than any other of the readily obtainable testing instruments. Fig. 1 is a general view of the Ohmmeter, from which it is seen to consist of a rectangular box about 6 inches wide, 3 inches deep and from 15 to 20 inches in length. At the extreme right hand there are some binding posts which connect with a small chloride of silver battery, the object of which is to furnish the necessary electromotive force for testing. In the cover of the box a small induction coil is placed and the indicating instrument, instead of being a galvanometer, is a telephone receiver, although, as is shown in the illustration, a galvanometer is provided so it may be used in case the inspector so desires. The operation of the Ohnmeter may be best explained by referring to the circuit shown in Fig. 2. At *R* a series of coils are provided having resistance respectively of 1, 10, 100, 1,000 and 10,000 ohms. The first of these coils is connected to the point *D*, while the terminal of the switch *R* is connected to the point *B* so that moving the switch from the contact at *R* the various resistances marked at these points may be introduced at the circuit *DB*. The point *D* extends to two binding posts at *X*, the left hand one of the posts being connected to the point *A*. The binding posts at *X* afford an opportunity for introducing an unknown resistance into the circuit between *D* and *A*. The points *A* and *B* are joined by a carefully selected wire having a constant resistance per unit of length. A telephone *T* is arranged to have one terminal connected with the point *D*, while the other terminal is joined by means of a flexible cord to a needle or knife edge *E*, which is plainly shown in Fig. 1. By means of the knife edge one of the terminals of the telephone can be connected to any point of the wire *A B*. From Fig. 2 it is also seen that one pole of a battery (usually the one which accompanies the box containing the Ohmmeter) is joined to *A*, while the other goes to *B*. A slight inspection of the diagram will show that we have here one-half of a Wheatstone Bridge, and it is evident that the battery current will divide at point *A*, a portion of it going along the wire *AB*, while the other portion passes from *A* to *B* through the unknown resistance *X* and the resistance coils at *R* to *B*. Now from the explanation given for the Wheatstone Bridge in previous papers, it can easily be seen that there will be some point along *A B* which will be at the same potential as the point *D*, while all other points along *A B* will have a different potential from that at *D*. If the knife edge *E* touch the wire *A B* a click will be heard in the telephone precisely similar to the familiar click of the busy test on a switchboard, but if the knife edge *E* touches a point on the wire *A B* that is at exactly the same potential as the point *D*, no click will be heard. The telephone *T*, therefore, forms a very sensitive means of finding that point on the wire *A B*, which is at the same potential as the point *D*. The little induction coil which is mounted in the cover of the Ohmmeter forms a valuable adjunct because this induction coil may be inserted in the battery circuit between *A* and *B*, and the pulsating current produced by the coil will after the same fashion of the batttery current divide at the point *A*, a portion of it passing along *AB*, while the remainder passes from *A* to *B* via *D*. Under these circumstances if the knife edge *E* touches any part of the wire *A B*, which is at a different potential than the point *D*, the telephone will buzz, reproducing the sound of the induction coils. But when the knife edge *E* touches that point of the wire *A B*, which is at the same potential as the point *D*, the telephone will be silent, so all that it is necesssary to do in making a resistance test with the Ohnmeter is to insert the resistance between the binding posts at *X*, start the induction coil running and move the knife edge *E* slowly along the wire *A B* until the sound of the telephone ceases. When this occurs the knife edge is touching the wire *A B* at a point having the same potential as the point *D*. Now the wire *A B* is carefully selected to have a uniform resistance from end to end, and consequently by knowing the resistance of unit of length in this wire, the resistance between *A* and *E*, and *E* and *B* can be at once ascertained by measuring the length of the wire between *A E* and *E B*, and multiplying by the resistance of a unit length of wire. For this purpose the engraved scales, shown in Fig. 1, are provided, which in the illustration are placed directly over the wire, but as they are loose they may be removed whenever a test is to be made. Now the formula of the Wheatstone Bridge shows that *X* (the unknown resistance) $= R \dfrac{A\,E}{E\,B}$ *R* is the resistance included at the switch, while $\dfrac{A\,E}{E\,B}$ is the ratio of the two portions into which the point *E* divides wire *A B*. $\dfrac{A\,E}{E\,B}$ is a ratio. The actual amount of *A E* or of *E B* is unimportant. Thus, for example: Suppose the switch was set upon the 1,000 ohm contact, and suppose the pointer *E* was one-

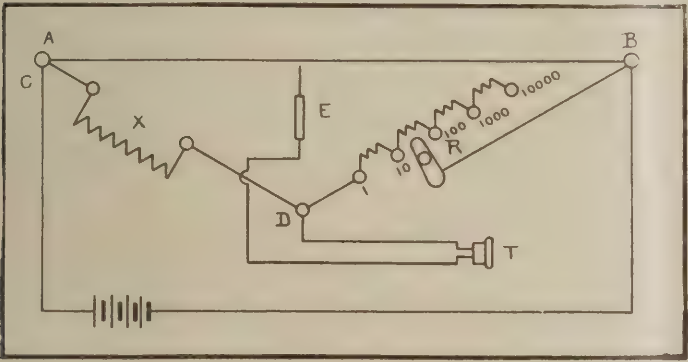


FIG. 2.

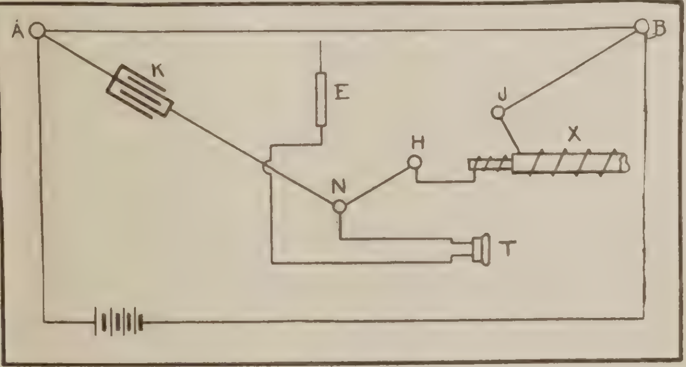


FIG. 3.

tenth of the distance from *A* to *B*, when the telephone becomes silent. The resistance at *X* would then be .01 of 1,000 ohms, or 100 ohms. Suppose the contrary, that the pointer *E* divided *A B* into two portions, one of which was 100 times as great as the other, then the value of the resistance at *X* would be 1,000 x 100 or 100,000 ohms. The simplicity and inexpensiveness of this arrangement is at once apparent. Such an instrument as is shown in Fig. 1 can now be obtained for about $65.00, or about one-third the price of a good Wheatstone Bridge, and for resistance measurements it has a capacity of from .002 of an ohm to 2,000,000 ohms, which is an ample range for any ordinary purpose. The Ohmmeter presents three other very valuable features, for it is able to measure inductance, capacity and the resistance of electrolytes with almost as great facility and simplicity as ohmic resistance, and in this respect it is superior to a Wheatstone Bridge, for with the latter the measurements of inductance, capacity and of electrolytes are attended with considerable difficulty and must be made with many precautions in order to secure results of accuracy. The circuit in Fig. 3 shows the arrangement of the Ohmmeter for the purpose of measuring capacity. In the place of the unknown resistance a standard (preferably an adjustable condenser) is inserted in the binding posts at *X*, while the unknown capacity to be measured is inserted at *R* in place of the resistance coils shown in Fig. 2. The pointer *E* is moved to and fro along the wire *A B* and if necessary the amount of capacity at *K* changed, until the needle finds a point upon the wire *A B*, which gives no sound in the telephone. The capacity *K* multiplied by the ratio of *A E* to *E B* gives the unknown capacity at *X*. Inductance can be measured in precisely a similar manner, that is a known and preferably variable inductance may be inserted at *K*, while an unknown inductance is placed between *H* and *J*, and the arm ratio between *A* and *B*, varied by moving the pointer to and fro until no sound is perceived in the telephone. The resistance of electrolytes or the electromotive force of batteries can be found in a similar manner because as the Ohmmeter uses an alternating current and balance is obtainable by the cessation of sound in the telephone, the testing of electrolytes or the comparison of the electromotive force of batteries is not complicated, as it is when such tests are made with the Wheatstone Bridge and by counter electromotive force of the thing under test. For tests of this kind a standard battery is inserted at *K* and the unknown battery placed between *H* and *J* and the Ohmmeter operated in the manner already described. Under these circumstances the ratio between *A E* and *E B* shows the ratio between the battery at *K* and the battery between *H* and *J*. From what has preceded it is apparent that the beauty of the Ohmmeter lies in its ability to find a multiplier or coefficient with which one can multiply a known resistance, capacity, inductance or source of electromotive force, in order to make it balance an unknown amount of the same nature, and thereby enable the inspector to deduce the value of unknown quantities with which he is dealing. In Fig. 1 the Ohmmeter is shown supplied with both a telephone and a Galvanometer. The Galvanometer is of essentially the same type and construction as that supplied with the Wheatstone Bridge. It is introduced in the Ohmmeter so that those who prefer the Galvanometer instead of a telephone may be accommodated, but a test with the receiver can be made so much more quickly and easily that few will return to the Galvanometer after a few trials with the receiver, which has demonstrated its superiority for this purpose.

CONTEMPORARY CROSS TALK

By "The Listening Key."

WE were discussing last week the probable style of switchboard of the city exchange of the future, the discussion having been started by Mr. Aitken's paper on divided multiple boards. The question really resolves itself into one of engineering economy and is practically not one of operating efficiency as one uninitiated might expect, at all. It has been thoroughly proven that with relay working the difference between a local and a trunked connection is greatly reduced over former figures and is not now sufficiently important to justify any such reactionary method as that of again relying on the public for part of the operation of the service. That proposal we will leave on one side for the moment to consider more particularly the question of engineering economy. It is generally appreciated that in the course of a few years we shall have five or perhaps ten telephone subscribers where we now have one. The subscriber's line, while being the most expensive part of the telephone system, is the part that is used the most uneconomically. It is idle the greater part of the twenty-four hours and usefully employed for but a very small period of each day. The local trunk line, on the other hand, is usefully employed for twelve times as long each day as the subscriber's line, and one local trunk carries the traffic of twelve average subscribers' lines. The divided multiple board would increase the twelve to save on the one. Surely the more correct theory is to save on the twelve and increase the one. Very short subscribers' lines and well loaded trunk lines are more likely to be the feature of city telephone systems of the future than long subscribers' lines and comparatively few trunk lines.

Small Districts and all Trunking

THIS means small districts, not large ones, and small districts in large cities naturally imply many districts, from which it in turn follows that the greater proportion of the traffic in each district will be trunked out to other exchanges. This means that eventually the multiple jacks will be removed from the answering boards and will appear only at the incoming trunk boards, and that all connections, local as well as incoming trunk, will be completed at the incoming trunk boards. The evolution of the city exchange is steadily in that direction and the evolution must complete itself sooner or later. The incoming trunk sections of a central office forming part of a large system have gradually grown to be a larger and larger proportion of the whole exchange equipment. They have now become a separate switchboard altogether occupying nearly two-thirds as much space as the answering boards of the exchange. The answering boards still have multiple jacks for the whole exchange, because with from 20 to 30 per cent. of the traffic local, it is still more economical to handle that traffic by means of those multiple jacks than to transfer it to a trunk board. As the number of districts increases the proportion of trunked traffic will go up and the proportion of local traffic will go down, until finally the point will be reached when it will no longer be economical to employ multiple jacks at the answering positions, but it will be found cheaper to simplify the answering boards and complete all connections at the incoming trunk board.

A Matter of Calculation

THERE this point will be reached is a matter of calculation. Not a very simple matter, for there are many factors in the question, but it is capable of being determined. An answering operator can deal with so many connections per day; a trunk operator can deal with so many more, usually about double. To handle the local traffic of an exchange at the incoming trunk boards will require the addition of so many B positions. At what point in the volume of local traffic will it be cheaper to employ extra trunk positions and extra trunk operators than to maintain multiple jacks at all the A positions? To take an extreme illustration, let us assume an exchange of 10,000 lines having a multiple board of 34 sections. The total traffic is 100,000 daily connections and the outgoing trunk traffic has gone up to 95 per cent., leaving only 5 per cent. local. We have 340,000 multiple jacks, with their attendant framework and wiring, being kept up for 5,000 daily calls—5 calls a jack a year. These five thousand daily calls could be handled at the incoming trunk board by the addition of three positions. To abolish the 340,000 multiple jacks at the cost of an extra section at the incoming trunk board and the yearly cost of three extra B positions would clearly result in a saving. At what lower point in the percentage of outgoing trunk traffic the saving would begin is a question that could be determined only by careful and detailed calculation, giving full consideration to all the factors in the case.

Factors, Old and New

FOR instace the cost of wiring the answering positions with local trunks and call wires to connect to the incoming trunk board would have to be considered, and also the addition to the outgoing trunk jacks required at every answering section. Various other small items will also occur to the thoughtful switchboard engineer. But in calculating the financial bearing of any such problem it must be borne in mind that the new arrangement would give rise to a much modified and vastly improved and simplified answering board, which would lend itself to a novel and attractive design and would allow of a much more economical arrangement of operating room space. Take away the imposing banks of multiple jacks, and the still more imposing tiers of cables behind them, and you at once remove the necessity for the answering board to be a vertical affair, continually trying to reach the ceiling, while the manufacturer and the engineer are continually trying to hold it down. The mass of cables in a multiple board makes it necessary for it to be one-sided, so that ready access to the cables may be had. Remove the greater proportion of the cables with the jacks attached to them and you remove the necessity for the one-sided arrangement. Even with multiple boards the horizontal pattern, with operators at both sides, has been used, and is still used, in some parts of the world. Get rid of the multiple jacks and cables, and it is easy to use a semi-vertical, semi-horizontal board that would have many advantages.

The Truncated Board

THE new form of answering board would be a sort of truncated multiple board placed back to back, with a trough in between for the wiring. You have often seen two men in an office working at tow roll-top desks, placed back to back, each man enjoying a certain amount of privacy, and having ample accommodation in which to store away papers in pigeon-holes while economizing in floor space. Now separate the desk a couple of feet for the troughing to accommodate the wiring, knock off a foot or so from the flat part of the desks and knock out the wings, place desks end to end along each line, and you have the new *Listening-Key* patent, semi-vertical, semi-horizontal, truncated, answering board. The flat part of the desk is the keyboard, and the pigeon-holes are the jack and signal panels. With such a clear description a diagram is hardly needed, but, perhaps, the little initial drawing, which shows an end section of the new board, will make it clearer. The most objectionable feature of such a board is obviously the trough between the two lines of switchboard, but as such a board would contain a relatively small amount of wiring and apparatus, and as switchboard wiring and apparatus is much more reliable than it used to be, this would not be an insuperable difficulty. Moreover, the trough would be easily accessible.

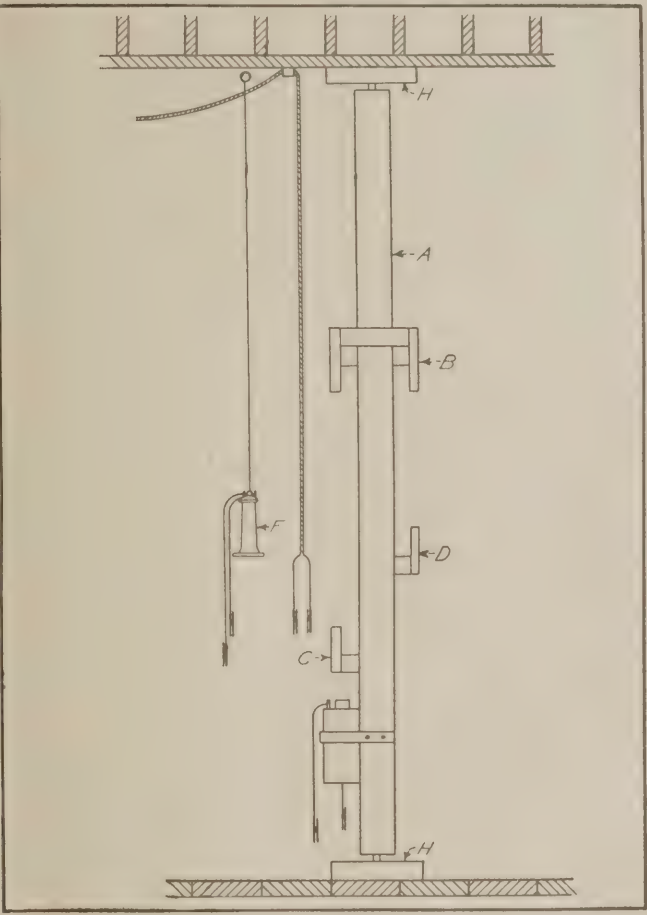
Some Advantages

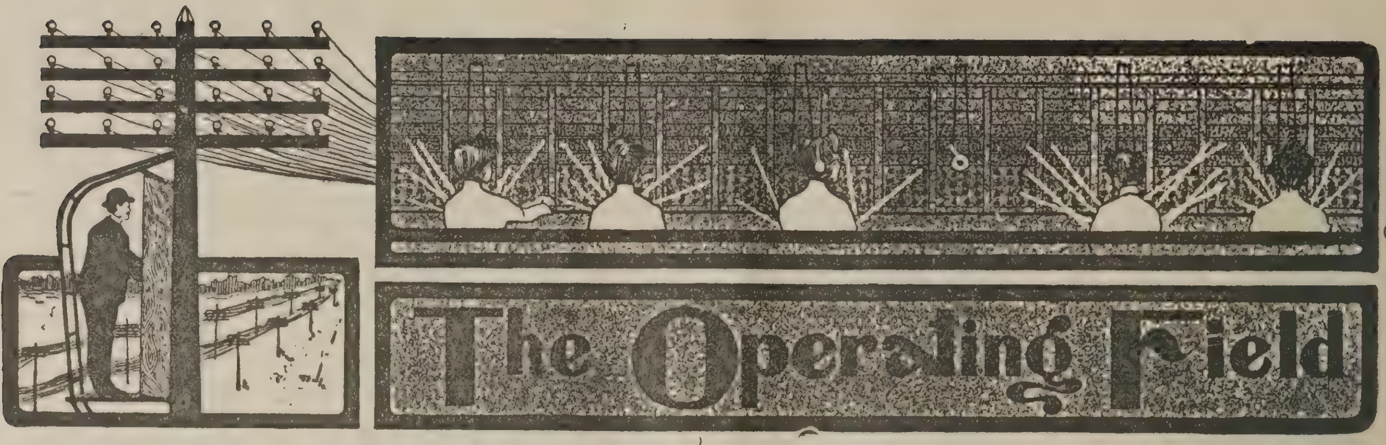
A BOARD arranged in this way would have many advantages. It would enable considerable economy in operating-room space to be made and a plan of arranging an operating room to accommodate a given number of line in a much smaller space than is now required could easily be devised. The truncated answering boards placed back to back would take up little more space for each double section than is at present occupied by a single section of vertical multiple board. Nor would it be necessary to fit the boards in one long line. The absence of the multiple jacks and the very much simpler wiring would allow of the boards being arranged in comparatively short lines in a square or oblong room, of which the vertical trunk board would occupy one end or side, or, perhaps, two sides. The supervision of the truncated boards would be extremely simple and effective. Between each pair of double rows of boards would be a platform raised above the level on which the operators' chairs would be placed, and the supervisor patrolling this platform could overlook the work of a row of operators on either side of her. The pilot lamps could be arranged in miniature lamp posts or lighthouses on the very top of the board, and would show up in a most conspicuous manner. The actual work of operating would be absolutely uniform, and would, in reality, be simpler for that reason. Every call would be handled in exactly the same manner. The answering operators would have to do no straining and stretching to reach high multiple jacks, as all the jacks would be within easy reach, the total height of the jack panels above the keyboard not being more than about 18 inches. All the tall girls could be put at the B positions.

A HANDY TELEPHONE TESTING RACK

By C. E. Nicholas.

IN our shop I have built for my inspector a test rack, a sketch of which is shown herewith. The standard *A* is a piece of 2x4 pine long enough to reach from the floor to ceiling, between the blocks *H*, *H*.. In the ends of the standard *A* are driven two spikes which fit into holes in *H* and *H* in such a way that *A* is free to revolve. Upon *A* are fastened two rests, *C* and *D*, in which the bottom of the backboard of the telephone to be tested is placed. Two rests are provided to allow either for a long or short telephone. The moveable part *B* is arranged to slide up and down on *A*, and is made to fit over the top of the backboard of the telephone, and thus hold it in place. The rack will hold anything from an extension bell to a tandem telephone. Below *C* are strapped 2 dry cells with cord extensions that have pinch snaps to fasten to the battery terminals in the telephone in the rack. *F* is a receiver with long cords. This receiver may be either put in series with the primary or transmitter circuit to test for its continuity, or it may be put in place of the old receiver to see if the trouble is in the secondary circuit. By having the battery and receiver on the rack an induction coil may be tested at any time. A long piece of lamp cord is fastened to the duplex wire which goes to the line. The cord can be held up out of the way by a pulley and weight. By placing the rack about 4 feet from a window, and the same distance from the work bench, it is possible to turn the rack, so as to allow the light to shine into the working parts of the instrument. The parts *B*, *C* and *D* are of ordinary ⅞ inch lumber, and are 2 and 4 inches long.





STATEMENT OF UNITED TELEPHONE AND TELEGRAPH COMPANY.

THE statement of the United Telephone and Telegraph Company, of Philadelphia, for April, 1903, and a comparative statement back to September, 1901, have been issued. The April statement is as follows:

Revenue.		
Telephones, 17,787	$31,340.61	
Toll line receipts	4,225.79	
Miscellaneous	725.02	
		$36,291.42
Expenses.		
Operation	$10,734.70	
Maintenance	5,041.96	
General expenses	1,992.41	
Taxes	945.55	
Insurance	253.23	
		$18,967.85
		$17,323.57
Interest on All Bonds.		
United Telephone and Telegraph Company, Cumberland Valley Telephone Company	$11,425.00	
Guaranteed dividend on stock of Cumberland Valley Telephone Company	391.17	
		$11,816.17
Net revenue, April, 1903		$5,507.40
Net revenue for year, based on above, deducting operation, maintenance, general expenses, taxes, insurance and interest on bonds		$66,088.80
Net revenue, February, 1903	$4,972.01	
Per year		$59,664.12
Net revenue, March, 1903	5,464.24	
Per year		65,570.88
Net revenue, April, 1903	5,507.40	
Per year		66,088.80

COMPARATIVE STATEMENT OF UNITED TELEPHONE AND TELEGRAPH COMPANY FROM SEPTEMBER, 1901, TO APRIL, 1903.

	Telephones,		*Tolls,*		*Rentals,*		*Total Tolls and Rentals,*	
	1901-2.	1902-3.	1901-2.	1902-3.	1901-2.	1902-3.	1901-2.	1902-3.
September	7,943	16,605	$521.31	$2,925.27	$14,932.71	$29,496.13	$15,454.02	$32,421.40
October	8,126	16,770	618.14	3,273.03	15,303.81	29,811.47	15,921.95	33,084.50
November	8,345	16,908	657.21	3,282.35	15,706.40	30,029.21	16,363.61	33,311.56
December	8,543	17,248	741.67	3,030.17	16,114.52	30,246.90	16,856.19	33,277.07
January	9,548	17,370	923.14	3,351.96	17,994.61	30,486.09	18,927.75	33,838.04
February	9,722	17,560	1,096.23	3,054.88	18,407.38	30,839.66	19,503.61	33,894.54
March	13,365	17,723	1,072.29	3,981.94	24,250.12	31,115.54	25,322.41	35,097.48
April	13,612	17,787	1,933.06	4,225.79	24,718.57	31,340.61	26,651.63	35,566.40
May	13,860	......	1,746.95	....	25,139.65	....	26,886.60	....
June	14,149	......	2,099.62	....	25,678.52	....	27,778.14	....
July	16,185	......	2,336.11	....	28,679.69	....	31,015.80	....
August	16,360	......	2,761.76	....	29,011.98	....	31,773.74	....

This company operates in the eastern part of Pennsylvania and northern part of West Virginia.

CONVENTION OF NORTHWEST IOWA ASSOCIATION.

By Ward Ferguson, *Secretary.*

THE quarterly meeting of the Northwest Iowa Independent Telephone Association was held on July 15 at Arnold's Park, Iowa. The meeting was called to order by Dr. G. W. Greaves, president of the association. After a few minutes of social meeting the assembly proceeded to business. Dr. T. S. Ward opened the meeting with the discussion of "Construction and Connection of Toll Lines." In connection with this discussion, Dr. Greaves read a form of contract to be entered into between toll-line companies. The result of the discussion was the passage of the following motion: Moved that a committee of five be appointed to report a method of furthering the question of long-distance toll service at our next meeting. The committee appointed consisted of Dr. T. S. Waud, S. S. Lichty, W. P. Chambers, Dr. G. W. Greaves and W. G. Coleman. Mr. Ed. Peters, troubleman at the Spencer Telephone Exchange, read a paper on "Exchanges and Their Construction." Mr. L. W. Mack, secretary of the Rural Union Telephone Company, of Humboldt County, but who resides at Livermore, gave in an address his "Experiences in Promoting Farm Lines." George B. McCarthy, of Emmetsburg, gave the association an interesting talk on "Some Experiences of a New Man in Telephone Work."

A motion was made that the committee on toll-line service be authorized to call a meeting of the association at an earlier date than the next regular meeting, if they deem it necessary. The motion was carried. It was also moved that the next meeting of the association be held at Emmetsburg. This motion was carried. The meeting then adjourned.

A careful canvass among the telephone men present at the meeting showed that there is great activity among the companies in the building of farm lines. The people are becoming more and more interested in the advantages of telephone service.

Mr. L. L. Hill, of the Page & Hill Co., Minneapolis, dealers in cedar poles, and Mr. F. M. Ferguson, of the Swedish-American Telephone Company, presented handsome souvenirs to all delegates present, which were greatly appreciated by the recipients.

Those present were: Walter Wildman, Carwith; W. P. Chambers, Carwith; George B. McCarty, Emmetsburg; Dr. T. S. Waud, Germania; Dr. G. W. Greaves, Spencer; Cris Ottosen, Ottosen; H. J. Aschatz, Algona; Ward Ferguson, Rolfe; Ed. Peters, Spencer; Dr. D. C. Steelsmith, Melvin; George Kraft, Melvin; J. Wachtel, Melvin; L. D. Hack, Livermore; C. M. Webb, Rolfe; C. D. Faulk, Rolfe; Ralph Hill, Bloomfield; Dr. Q. C. Fuller, Milford; C. Torstenson, Milford, and W. H. Barker, Sanborn. The following supply men were present: W. R. Hind, F. B. Switzer, William Bowen, L. L. Hill, F. M. Ferguson and S. S. Lichty.

ELECTRICAL CONTRACTORS' CONVENTION.

THE third annual convention of the National Electrical Contractors' Association was held in Detroit, Mich., on July 14, 15, 16 and 17. The meeting was purely an executive one, there being no technical papers read. From a spectacular standpoint this was undoubtedly the most successful electrical convention ever held. The officers elected for the ensuing year are: E. McCleary, Detroit, president; W. I. Gray, Minneapolis, first vice-president; F. P. Coughlin, Worcester, Mass., third vice-president; John R. Galway, Washington, D. C., treasurer; W. H. Morton, Utica, N. Y., secretary; J. C. Stearns, Buffalo, sergeant-at-arms. The 1904 meeting will be held at St. Louis.

Among the companies represented were the following: Maltby Lumber Co., I. A. Maltby and A. Maltby; Holtzer-Cabot Electric Co., Boston, New York and Chicago, E. R. Harding and T. M. Einema; John A. Roebling's Sons Co., Trenton, N. J., F. W. Harrington, G. W. Swan, Charles B. Cushing, W. P. Baronan, W. F. Richardson, W. W. Affleck and J. W. Brook; National Carbon Co., carbons and batteries, E. J. Chino; Browning Mfg. Co., Milwaukee, dynamos and motors; S. A. Bran; Manhattan Electrical Supply Co., general supplies, John McDowell; the F. Bissell Co., Toledo, Ohio, electrical supplies, M. Walker; Electric Appliance Co., Chicago, general supplies, Mr. Upman and Mr. Rawls; DeVeau Telephone Mfg. Co., New York, Mr. DeVeau and Mr. Gilpin; Bossert Electric Construction Co., Utica, N. Y., F. T. Foxenberger; Allen-Hussey Co., Chicago, interior telephones, A. R. Hussey; the Miller Anchor Company, Norwalk, Ohio, Mr. Miller; Crouse Hinds Electric Co., Syracuse, N. Y., switchboards, panel boards, etc., F. M. Hawkin, A. F. Hill and F. F. Skeel; American Push Button Telephone Co., New York City, intercommunicating telephones, W. V. Sweetern and William F. Van Benthuysen; THE AMERICAN TELEPHONE JOURNAL, R. B. Abbott.

The Holtzer-Cabot Electric Co. attracted considerable attention by placing at the various booths their inter-communicating telephones and giving service over them. This was a great convenience, and it was highly appreciated by the delegates. The Allen-Hussey Co., of Chicago, displayed a 30-section portable automatic self-restoring school switchboard, which was manufactured for the new public school building at Schenectady, N. Y. The De Veau Telephone Manufacturing Co., of New York City, had located throughout the various booths stations, belonging to a system of their intercommunicating telephones, which they had working at the exhibition.

MORTGAGE ON MICHIGAN BELL FORECLOSED.

THE decree of foreclosure in the case of the Old Colony Trust Company vs. the Michigan Telephone Company was recently signed by Judge Swan in Detroit, Mich. No provision was made in the draft of the decree for the amount to be paid the Old Colony Trust Company for fees to be paid its numerous attorneys in foreclosing the mortgage. The attorney for the trust company suggested 2 per cent. upon the bonded indebtedness, which would be something over $100,000. Judge Swan was not prepared to make this allowance offhand. The matter was referred to his clerk, who will take testimony within a week. The fees to be paid the Union Trust Company for acting as receiver will not come up at this time.

The attorney for the Michigan Telephone Company suggested two changes in the decree, both of which were overruled. A clause allowing the purchaser to renounce all contracts and leases on his option, he moved to amend so as to except the license contracts of the Michigan Telephone Company for the use of Bell instruments. The other motion was that sixty days be given within which to redeem the real estate belonging to the company, following the State statutes. In addition to the fact that redemption was waived by the terms of the mortgage, the attorneys for the complainant contended that the several kinds of property should be sold in entirety.

INDIANA COMPANY INCREASES CAPITAL STOCK.

CONTRACTS were recently signed whereby local stockholders of the Logansport, Indiana, Telephone Company became the owners of all the stock in that company. Several Fort Wayne capitalists retired from the field and the $87,500 of stock owned by them was bought by the local capitalists. With this change also comes an increase in the capital stock of the company, the secretary of state having been notified that the capital stock had been increased from $150,000 to $350,000.

These changes were planned several months ago, but the local men feared that they would not be able to complete the deal owing to publicity, so the matter was kept quiet. Now, the deal is complete and within a short time it is predicted, work will be begun on the extensions planned for the local system. The increase in stock is made to cover expenditures necessary for the new construction. In a short time work on the local toll lines will be commenced. Expenditures for this will be included in the $200,000 additional stock which was subscribed.

AUTOMATIC SYSTEM FOR OTTAWA, CANADA.

A SHIPMENT of their first complete practical automatic telephone exchange system was recently made by the American Machine Telephone Company, of Piqua, Ohio. The shipment was consigned to the Canadian Machine Telephone Company far an exchange to be installed at Ottawa, Canada. The new exchange has a capacity of 10,000 telephones. It will be installed immediately upon arrival in the Dominion's capital city.

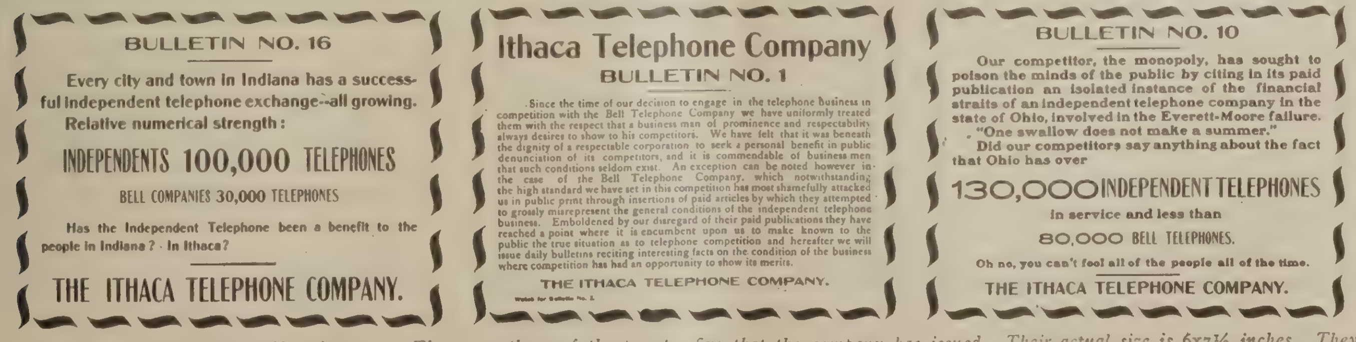
The Canadian rights for the American Machine Company's equipment have been sold to the Canadian Machine Telephone Company.

ATLANTA PRESIDENT ENTERTAINS LADIES.

PRESIDENT C. J. SIMMONS, of the Atlanta Telephone Company, recently entertained at dinner thirty-eight of the company's young ladies. The dinner was arranged in celebration of the installation of the new apparatus which is being put in by the company.

COMEDIAN ADVERTISES TELEPHONICALLY.

AN enterprising comedian recently appeared at short notice in Onondaga, a small town in Michigan, where there was no newspaper to announce him. He had the operator at the telephone exchange call up every telephone subscriber and played to a crowded house.



BULLETIN NO. 16

Every city and town in Indiana has a successful independent telephone exchange--all growing.

Relative numerical strength:

INDEPENDENTS 100,000 TELEPHONES

BELL COMPANIES 30,000 TELEPHONES

Has the Independent Telephone been a benefit to the people in Indiana? - In Ithaca?

THE ITHACA TELEPHONE COMPANY.

Ithaca Telephone Company

BULLETIN NO. 1

Since the time of our decision to engage in the telephone business in competition with the Bell Telephone Company we have uniformly treated them with the respect that a business man of prominence and respectability always desires to show to his competitors. We have felt that it was beneath the dignity of a respectable corporation to seek a personal benefit in public denunciation of its competitors, and it is commendable of business men that such conditions seldom exist. An exception can be noted however in the case of the Bell Telephone Company, which notwithstanding the high standard we have set in this competition has most shamefully attacked us in public print through insertions of paid articles by which they attempted to grossly misrepresent the general conditions of the independent telephone business. Emboldened by our disregard of their paid publications they have reached a point where it is encumbent upon us to make known to the public the true situation as to telephone competition and hereafter we will issue daily bulletins reciting interesting facts on the condition of the business where competition has had an opportunity to show its merits.

THE ITHACA TELEPHONE COMPANY.

BULLETIN NO. 10

Our competitor, the monopoly, has sought to poison the minds of the public by citing in its paid publication an isolated instance of the financial straits of an independent telephone company in the state of Ohio, involved in the Everett-Moore failure.

"One swallow does not make a summer."

Did our competitors say anything about the fact that Ohio has over

130,000 INDEPENDENT TELEPHONES

in service and less than

80,000 BELL TELEPHONES.

Oh no, you can't fool all of the people all of the time.

THE ITHACA TELEPHONE COMPANY.

The above bulletins are self-explanatory. These are three of the twenty-five that the company has issued. Their actual size is 6x7½ inches. They appeared in the daily papers and also were distributed.

The Editor's Page.

"THE MONTHLY NOT IN THE RUNNING."

AN ADVERTISING EXPERT'S OPINION.

It has been our privilege recently to print several extracts from a letter written by Mr. Elmer E. Smith in which he pointed out, in graphic fashion, the hopelessness of monthly literature in so active a field as modern telephony. Mr. Smith, it is conceded, is an expert on the subject, but even he must feel flattered at the sweeping endorsement given his statement by the contents of the July issue of the monthly paper, *Telephony*.

> "Last year," wrote Mr. Smith, "an average of over three telephone companies were formed every day—in round numbers 1,000 for the year. This year bids fair to exceed that growth.
>
> "Such a rare field of activity demands such a publication as The American Telephone Journal.
>
> "A monthly in such a field is not in the running, and of needs must duplicate from 75 to 80 per cent. of the matter that has already appeared in the weekly."

There are men in the industry who, while conceding Mr. Smith's general conclusions that "A monthly in such a field is not in the running," felt that his figures were somewhat radical when he wrote that "A monthly of needs must duplicate from 75 to 80 per cent. of the matter that has already appeared in the weekly."

An analysis of the July *Telephony* must convince the most doubtful that Mr. Smith, instead of being radical, was ultra-conservative in his estimate, as was to have been expected from so careful and competent a man.

As the question is of general concern to those who have business interests that depend on telephone development, to operators as well as to manufacturers, to readers of telephone papers as well as advertisers that use space in these papers, we venture to present such an analysis, which is the best possible measure of the enormous strides made by the Independents.

The leading feature of the July *Telephony* was a report of the seventh annual convention of the Independent Telephone Association of the United States. This report in full had appeared a week before in The American Telephone Journal, so that the seventeen pages devoted to it by *Telephony* were "dead" matter to all the men in the telephone field. Five and a half pages were given up by *Telephony* to the "news" of the sale of the Kellogg Company to the American Bell interests. We quote the word "news" because to the monthly it was still fresh matter, though The American Telephone Journal had published all the facts in its issue of June 13, nearly four weeks before. This Kellogg sale was the most sensational and important matter that had been presented to the trade for years, yet the monthly could not print it until four weeks after the announcement had been made public and all the facts were ancient history. Seven and a half pages were devoted by *Telephony* in July to a "digest of patents" covering the telephone art. These patents had been issued in Washington in May and June and had been digested in The American Telephone Journal at the time of issuing, so that they were from three to six weeks old to the telephone public by the time *Telephony* re-published them. Two pages were taken up by *Telephony* with an article on "The Collins System of Wireless Telephony," which had been printed, photographs and all, in *The Electrical World* of May 16, more than six weeks before. "Is Telephone Competition in Canada Possible?" which occupies over two pages in *Telephony's* July number, was printed in full in The American Telephone Journal of June 27. Another article, "Telephones in Sweden," also printed as original matter, without credit, was originally published in the London *Telegraph* last December. Its last recorded appearance in this country previous to its presentation in the July *Telephony* was on March 23 last in the Elmira (N. Y.) *Gazette*. An account of the convention of the New York State Telephone Association is printed by *Telephony* on page 23 of its July issue. This convention was held at Utica June 10, and a full report of the proceedings, prepared by its special representative on the spot, was given in The American Telephone Journal on June 13. *Telephony* also in this number prints an account of the convention of the Florida Independent Telephone Association which was given in the June 6 issue of The American Telephone Journal, or one month before.

The "news" of the "Federal Telephone Refinancing" appears on page 27 of July *Telephony*. The full details of this refinancing in the shape of an official statement from President Dickinson, of the Federal Company, appeared in The American Telephone Journal on May 2 and May 30, or some weeks before. And so it runs all along the line, until it is made clear that it is not only 75 or 80 per cent. of the matter already printed in the weekly publication that is duplicated in the monthly, but nearly 90 per cent.

It will be seen, therefore, that Mr. Smith was very modest in his claims, and we take much pleasure in fortifying his figures with the facts. We do this with especial pleasure in this instance, as it is to the general credit of the telephone industry that the monthly is no longer "in the running," for it means that progress is moving so swiftly that it is about all even a weekly can do to keep up with the news.

FOREIGN CURRENTS

By "The Arrester."

THE last number to hand of the London *Electrician* publishes a summary of the discussion on Mr. W. Aitken's paper on Divided Multiple Switchboards, and adds some editorial comment on the paper and the discussion. The editor of the *Electrician* is doubtless keenly interested in telephony, but evidently not very familiar with the details of the work. He thinks that for the majority of places the present systems in vogue will meet all requirements, but that in densely populated places new methods of working will have to be devised. Commenting on the 3-10-inch jack, which by a slip that robs the sentence of meaning he calls the ½-inch jack, he next perpetrates this: "Yet it is evident that the size of the spring jack and the acuteness of the operator's eyesight cannot be increased indefinitely." What is meant can be understood, though we are not trying to increase the size of the spring jack, nor do operators, as the editor of the *Electrician* apparently believes, find multiple jacks by their individual numbers. Even if the jack could be reduced to 1-5 inch the operators could still find them without increased acuteness of eyesight. There are undoubtedly cases, thinks the *Electrician,* in which at first sight a "divided multiple" system should offer considerable advantages. In the city portion of London, for instance, there are already more subscribers than a single exchange can accommodate, and the average distance of each subscriber's station from the centre is small. If all junction connections could be avoided it could hardly be doubted that the working would be more efficient. There are 7,000 subscribers to the Post Office main exchange and 85 per cent. of the calls are trunked out.

The "Electrician" Proceeds

"THERE is, however," remarks the *Electrician,* "another point of view—namely, that of capital expenditure, and in this Mr. Gill's remarks must be allowed to carry due weight. The "time-factor," as he termed it—*i. e.,* the proportion of the day during which the lines are employed—is extremely low for subscribers' lines and relatively high on junction lines. With message rates this ratio of difference will be even greater. Therefore, money may be more advantageously spent on junction lines than on long subscribers' lines. This result leads in opposite direction to that proposed by Mr. Aitken, *viz.,* to decentralization rather than to centralization, and the numerous small private exchanges advocated by Mr. Webb assist greatly in this, if these exchanges are properly operated. Mention should be made in this connection of the Paris system, in which the multiple board is gradually being abandoned altogether, and even local calls are treated as junction calls." Just where the "connection" comes in it is a little difficult to see, because the change said to be making in Paris is rather in the direction advocated by Mr. Aitken. Moreover, in telephone affairs in Paris there is no "system," properly speaking—merely confusion gradually becoming more confounded.

The "Electrician" Concludes

THE final paragraph of the *Electrician* comments shows rather a curious state of mind for a telephone critic. It runs as follows: "Returning again to Mr. Aitken's propositions. Should a divided multiple system find favor, this will largely be on account of the simplicity in operating and in the apparatus. The added complication of central battery working and automatic signalling would largely counterbalance this. Since the elimination of junction working would make operating easier, the elaborate central battery system is no longer necessary to assist the operator. There is, in fact, much to say on all sides of the question, and Mr. Aitken's paper merited discussion on far broader lines than those followed by the majority of speakers." That may be so, but the *Electrician* hardly supplies the broader lines nor even indicates them, as witness the confusion of thought and statement in the remarks just quoted. Central battery does not add complication to the working, but simplifies it. It may add to the complication of the central office equipment, but in return it simplifies the thousands of subscribers' instruments, far more expensive and difficult to maintain than the exchange plant. With easier operating, says the *Electrician,* the central battery system may be abolished, being "no longer necessary to assist the operator." This is simply absurd. No telephone man having once had experience of central battery working and automatic signalling would dream of returning to local batteries and non-automatic signalling. Even Mr. Aitken would not advocate divided multiple boards worked in any other manner than by central battery.

Customers Embarrass Portsmouth

THE municipal telephone system recently set in operation at Portsmouth continues to report an embarrassing rush of customers for its service. Mr. A. R. Bennett's original estimates provided for 1,240 complete telephone lines at $97.50 each, and 300 partially completed lines at $40 each, making $132,400 in all. From a report recently presented by the manager of the system it appears that all these lines, with the exception of 88, have been provided. The total outlay on the scheme comes to just within the estimates. The manager now recommends that an extension of 760 lines be taken in hand, at an estimated cost of $60,000, as follows:

420 new lines at $93	$39,060
60 inside extensions at $25	1,500
280 spares at $53	14,640
Buildings, etc.	2,900
Contingencies	1,900
	$60,000

It is proposed to open exchanges at the outlying places, as the demand requires. The Telephone Committee has approved the estimates and recommends the Town Council to apply to the Local Government Board for powers to raise the $60,000 required. The net profit for the previous month was $250, and the surplus bids fair to grow larger as the connections increase.

DIAGNOSIS BY TELEPHONE.

RECENTLY a loving grandmother, just promoted to the honors of the relationship, was awakened by the telephone ringing. When she answered, her daughter in an alarmed voice said: "I'm sure baby has the croup; what shall I do?" Grandmamma promised to come to her daughter as soon as possible, and in the meantime communicated with the family doctor. He in his turn requested to be put in connection with the anxious mother and bade her lift the child to the telephone so that he might hear it cough. The child coughed and the doctor at once declared the ailment to be of no consequence, and the disturbed family settled once more peacefully to rest.

TELEPHONES IN PHILADELPHIA HOSPITAL.

THE Methodist Hospital, of Philadelphia, is installing a new telephone system which connects each building, ward and private room in the hospital. When the system is completed a patient whose condition will allow it may converse with anyone who has access to a telephone, be he either in Philadelphia or hundreds of miles away.

In the near future it will be possible for patients to talk from their beds to relatives or friends outside of the institution, and to receive messages directly from those who might be debarred from calling in person.

The Telephone in the Courts

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

POWER TO RE-ASSESS OMITTED PROPERTY.

THE important tax case of Robert A. Parkinson, county treasurer, vs. the Jasper County Telephone Company has been decided by the Supreme Court of Indiana. The telephone company brought suit for an injunction to restrain the county treasurer from collecting certain taxes levied against the company. The telephone company alleged that the assessor of Jasper County made certain assessments of property of the telephone company alleged to have been omitted from its assessments for 1896, 1897 and 1898. The property thus assessed were telephone instruments in several townships, a switchboard in the city of Rensselaer, a franchise to use the streets and alleys of that city for the company's lines and the capital stock over and above the value of the tangible property. It was further alleged that the telephone company presented the matter of the assessments on account of the alleged omissions to the State Board of Tax Commissioners and that the board fixed the assessment of the company at $175 per mile; that this assessment included all the omissions. The company also alleged that the true value of all the assessed property, rights, choses and franchises of the company during the years 1896, 1897 and 1898 was represented by its capital stock, which had been assessed, and that the action of the county assessor was only a re-valuation of its property.

The answer of the defendant was that in the years 1896, 1897 and 1898 the State Board assessed the lines of the company upon the basis of the value of the capital stock after deducting the value of the telephones, switchboard and Rensselaer franchise, and that thus the latter wholly escaped taxation during the three years.

The Supreme Court decided that the County Board of Review had power to add omitted property, but only property omitted from the lists of the current year. Neither the county board nor the state board had authority to re-assess property assessed in previous years because of undervaluation in such years, nor was there any provision authorizing the state board to make an original assessment of property for previous years, as property omitted from taxation for such years, or to increase the assessment of property for the current year because of omissions of previous years. It further held that when the state board has assessed the capital stock the franchises of the corporation are to be regarded as having been included in the assessment. Although sustaining most of the company's contentions, the court refused to grant the injunction asked for because all the taxes sought to be enjoined were not invalid, some of the company's tangible property in dispute having been placed on the tax duplicate as omitted property for current years by the local officers. The bill of complaint was therefore dismissed.

Parkinson vs. Jasper County Telephone Company, 67 N. E. 471.

"PUBLIC ROADS" DOES NOT INCLUDE "CITY STREETS."

THE text of the opinion of the Supreme Court of Nebraska in the case of the Nebraska Telephone Company vs. Western Independent Long Distance Telephone Company has just been published. The suit was for an injunction, restraining the defendant from constructing its lines in the streets of Louisville, Neb., in such a way as to interfere with the plaintiff's occupation of the streets. While the defendant denied that its lines would interfere with plaintiff's system, it established its defense upon the alleged absence of right in the plaintiff to occupy the streets of the village. The plaintiff based its right to use the village streets, not upon any grant from the village, but solely on a State law granting to any incorporated telephone company "the right of way along any of the public roads of the State for the erection of poles and wires." It was insisted on behalf of the plaintiff that the term "public roads" in the section quoted included the streets and alleys of a municipal corporation.

The court cited decisions of the Minnesota and Iowa Supreme Courts in favor of the plaintiff's contention, but overruled it in spite of them. The question, it said, was merely one of legislative intent. Ordinarily in construing a statute, words should be given their usual and recognized meaning. In the State of Nebraska the term "public road" is commonly understood to apply exclusively to rural highways. Another statute passed at the same session of the Legislature gave to cities of the metropolitan class power to enact ordinances to prevent the use of their "streets and alleys" for the support of telephone poles and wires. The use of "streets and alleys" instead of "public roads" in that act indicates that the Legislature had in mind the popular distinction between the terms. The court therefore held that the plaintiff had no right to use the streets of the village of Louisville. The plaintiff contended, however, that the State or the village alone could successfully assail its right to the use of the street. In answer to this the court said that the plaintiff's occupancy of the streets without right constituted a public nuisance, and the plaintiff in the suit was invoking the extraordinary powers of a court of equity to protect it in maintaining such a nuisance. To do so would be contrary to the principles that have always guided such courts in the exercise of their powers.

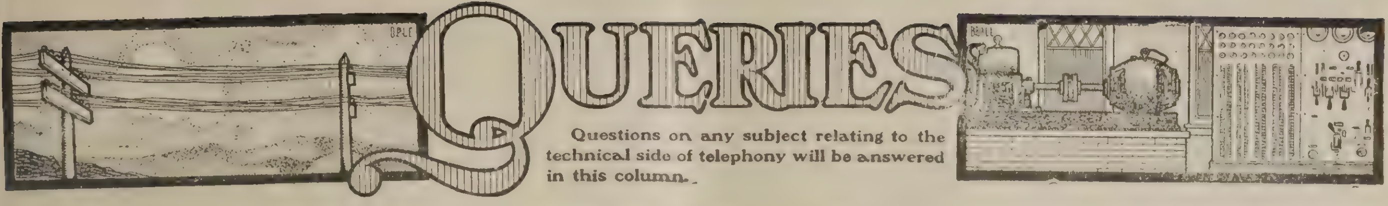
Nebraska Telephone Company vs. Western Independent Long Distance Telephone Company, 95 N. W. 18.

A CASE OF CONTRIBUTORY NEGLIGENCE.

THE United States Court, sitting at Columbus, Ohio, in deciding the case of William Britton v. The Central Union Telephone Company enunciated the principle that a telephone company is not liable for injuries to a lineman in its employ when the lineman, working on a toll line which has been abandoned by the company, climbs a pole without first testing its safety. The plaintiff, a lineman of intelligence and education, climbed the pole without examining into its condition. The pole broke, he fell from it and was severely injured. He sued the company for $20,000 damages and a jury returned a verdict for $5,500. This judgment was set aside on the ground of error in the charge and upon the retrial of the case the judge instructed the jury to return a verdict for the defendant upon the ground stated.

PROMOTER SUES FOR THE PRICE OF HIS SERVICES.

T. S. WARD, of Baltimore, one of the promoters of the National Telephone Company, of Wheeling, W. Va., is suing that company in the circuit court of Wheeling for a large sum that he claims to be due him for services in founding the company. A demurrer made by the defendant to the plaintiff's bill of complaint has been overruled and the defendant given fifteen days to file its answer.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

Conducted By WILLIAM W. DEAN

GROUND ON COMMON BATTERY.

I have noticed in diagrams of common battery telephone systems that one side of the battery is connected to the ground. Sometimes it is the negative and sometimes it is the positive side that is so connected. Will you please tell me through the AMERICAN TELEPHONE JOURNAL why the battery is grounded and also why sometimes it is sometimes one pole and sometimes the other that runs to the ground. F. B. S.—146.

In all cases the positive pole of the battery should be grounded. The grounding of the battery in common battery systems is of great importance as it is impossible to keep any system free from grounds and it is better to have a definite ground in place of an indefinite one; for example: Take an exchange of 1,000 lines with a minimum line insulation of 10,000 ohms per line, the insulation of the whole system would be about 10 ohms, so that it is just as well to put a ground on the battery. With a definite ground, lines and apparatus which are grounded can be readily located and also indefinite crosses in central office apparatus can be more easily found. The reason of grounding the positive pole of the battery is to prevent electrolytic action on the wires at points where leakage occurs.

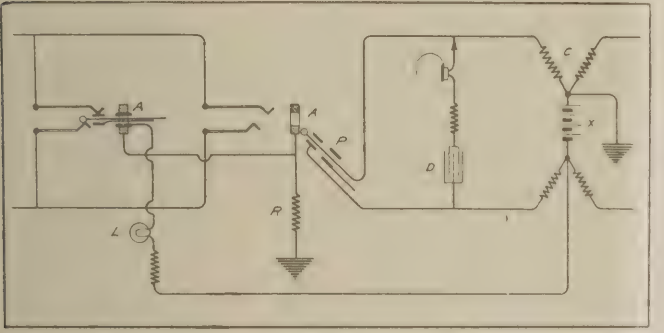


FIG. 151.

POLING A RECEIVER.

What is meant by "poling" a telephone receiver. I have read that this had to be done when a receiver was connected to a common battery telephone. Will you please explain what it means and why it has to be done? S. T. D.—147.

In a common battery circuit where the current for the subscriber's transmitter passes through the receiver, the latter must be connected in the circuit so that the battery current will increase the strength of the receiver magnet, if connected in the opposite way the battery current will de-energize the receiver magnet and reduce the efficiency of the receiver. Receivers for this style of circuit are usually made with a larger air gap between the diaphragm and poles to allow for the increased magnetic field caused by the battery current flowing through the receiver coils.

NOISY COMMON RETURN.

We have a common return system here which is pretty noisy. An old telephone man told me that if I grounded the return wire at the central office it would take the noise off. I tried it, but I could not see any difference. Is there any truth in what he says? A. L. W.—150.

The common return is probably grounded at some point or may be exposed to an electric light or power circuit either of which will cause noise. The grounding at the office will not remedy the trouble. It is a good plan to ground the return through a fuse at the office to prevent damage in case of a cross outside with a high voltage circuit or from lightning. A switch on each return is also convenient when it is necessary to open them in testing for outside trouble.

BUSY TEST ON CENTRAL ENERGY BOARD (151).

Will you please explain through the columns of the AMERICAN TELEPHONE JOURNAL what causes the click heard in the operator's receiver when the tip of the answering plug is touched to the ring of a multiple jack of a busy line? I am employed by a Bell company in a common battery exchange. I have read descriptions and have seen diagrams of the circuit, but have been unable to understand the electrical action.—C. E. B.—151.

There are three circuit combinations which give the busy test on the Bell multiple switchboard, a simplified diagram of which is shown in Fig. 151.

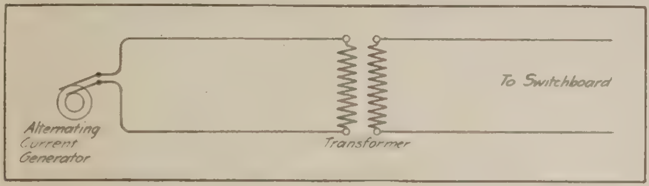


FIG. 155a.

First—There is a discharge of the condenser *D* in the operator's receiver circuit when the tip of the calling plug *P* touches the test of the jack A^1, due to the difference of potential of the condenser, which is charged by the 24-volt battery *X*, and the circuit through the cut-off relay *R*, jack *A* and supervisory lamp to the battery *X*.

Second—There is a click when the contact between the calling plug *P* and the test jack A^1 is broken, due to the condenser *D* being recharged by the battery *X*.

Third—When the tip of the calling plug *P* makes contact with the test jack A^1 it forms another path to ground through the repeating coal *C* for the current which is flowing through the supervisory lamp operating the cut-off relay *R*. When the contact between the plug and jack is broken, the discharge from coil *C* passes through the operator's circuit, which is bridged across the repeating coil circuit.

PACKED TRANSMITTER (152).

Will you please tell me what is the real meaning of the term, "A packed transmitter?" What causes "packing?"—F. E. A.—152.

A packed transmitter is one in which the granular carbon does not move freely between the electrodes. It is sometimes caused by the transmitter being subjected to a slight vibration, which causes the granules to settle down, and if the transmitter is not used the granules pack tightly between the electrodes. It may be caused by passing too much current through the transmitter.

TRANSFORMER IN GENERATOR CIRCUIT (155).

In a diagram that I saw last week a ringing current generator was shown in circuit with a transformer as I have indicated in the sketch (Fig. 155a). What is the transformer for?—E. G. S.—155.

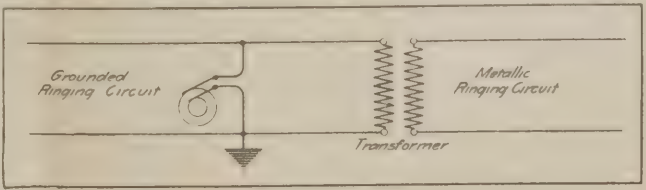


FIG. 155b1

The transformer in the ringing circuit may have been inserted to step the voltage of the ringing circuit either up or down. It is more than likely that it has been inserted to provide a ringing circuit which is free from grounds. This is desirable on leaky toll circuits where the bells are bridged. The diagram (Fig. 155b) shows how a transformer may be connected in the circuit so that a clean metallic circuit is obtained in addition to the regular grounded one.

PATENTS ISSUED

TELEPHONE TRANSMITTER.

Fred. C. Redfield, of Nassau, N. H., patents (No. 732,443) a telephone and assigns to the America Autophone Co., of Nassau, N. H. The object of this invention, which is shown in Figs. 1 and 2, is to provide a telephone transmitter that will obtain greater delicacy and distinctness in tone than that obtained from the usual type. The transmitter is provided with a fixed and a movable electrode, as shown in Fig. 1, and also a series of vibrators 22, these being made of different lengths and responsive to different tones.

Fig. 1.

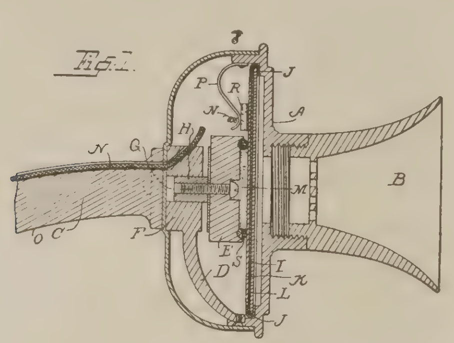
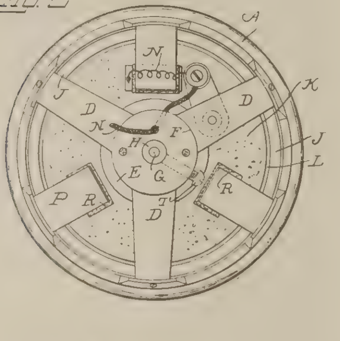


Fig. 2.

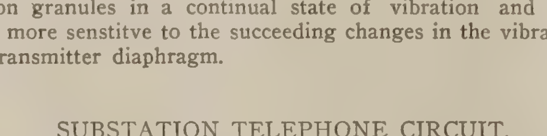


The transmitter shown in the figure is provided with 16 vibrators. In addition, on the stem 14 is mounted a resonant disk of well seasoned wood such as is used in the body of violins or musical instruments. The object of this disk is to reinforce the effect produced by the vibrators. The effect of the vibrators is to prolong the action of the voice vibrations or tones impressed upon the transmitter diaphragm, and thus to keep the carbon granules in a continual state of vibration and render them more senstitve to the succeeding changes in the vibration of the transmitter diaphragm.

SUBSTATION TELEPHONE CIRCUIT.

Almon B. Stetson, of Malden, Mass., patents (No. 732,795) a substation telephone circuit and assigns his patents to the American Telephone and Telegraph Co., of New York. The object of this invention is to provide a method of wiring at substations whereby the effect of side tones in the receiver of the talking instrument are materially reduced. This object is accomplished, as shown in Fig. 3, which represents two instruments connected through the central office *B* by the use of the induction coil *i*. One winding of the induction coil is connected to line *2* and the transmitter. The other winding is connected to the receiver and line *6*. It will be seen that the transmitter is connected in series in the line with one winding of the induction coil, while the receiver is connected in a local circuit with the other winding of the coil.

Fig. 3.



AUTOMATIC TOLL COLLECTOR.

Romeo B. Hazlett, of Philadelphia, Pa., patents (No. 731,899) an electrical indicator for telephonic toll collecting devices, and assigns to Chas. E. Wilson, of Philadelphia, Pa. The invention relates to an indicator adapted for use with toll collecting devices used at pay stations, the indicator being located at the central office. Fig. 1 shows an elevation. Fig. 2 a side elevation and Fig. 3 a vertical section of the indicator.

FIG. 1.

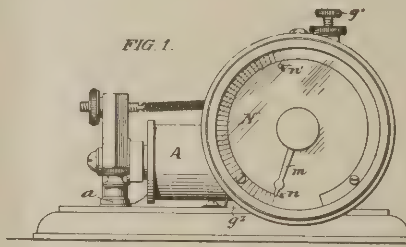


FIG. 2.

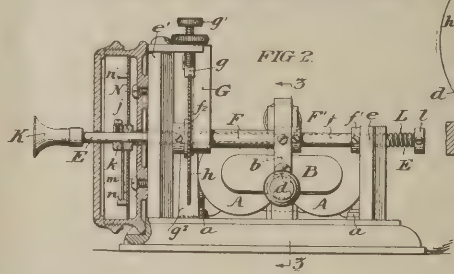
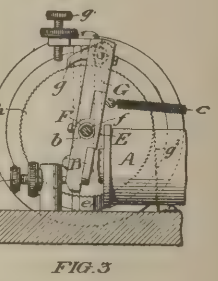


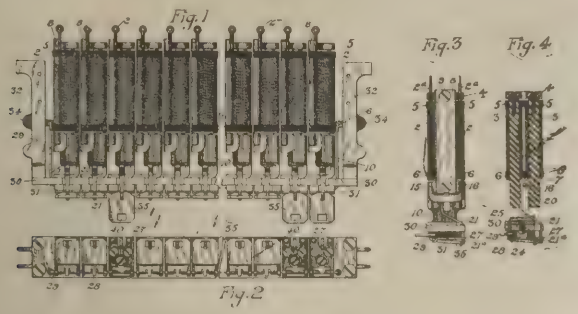
FIG. 3.



The device is operated by means of the double electromagnet *A*, *A*, which, by attracting and releasing its armature *B*, operates the arm *G*, the pawl *g* engaging with a tooth on the ratchet wheel *h*, when the armature is released and carrying the ratchet wheel forward. This movement of the ratchet wheel, which is fastened to the shaft *E*, serves to move the pointer *m* over the dial *N*, and thus indicate the amount of money deposited. The ratchet wheel is prevented from backward rotation by means of the pawl g^2, the pawl *g* locks with the set screw g^1 and prevents the ratchet wheel from slipping too far forward. The pointer *m* is held between the collars *j* and *k* on the shaft and is returned to its normal condition after use when the shaft is pulled forward against the tension of the spring *L* and the collars *j* and *k* separated. It is of course understood that the act of depositing any given coin in the collecting box serves to make and break the circuit through the indicator magnet a predetermined number of times.

ANNUNCIATOR.

Francis W. Dunbar, of Chicago, Ill., patents (No. 733,468) an annunciator and assigns his patent to the Kellogg Switchboard and Supply Company. Fig. 1 shows a plan view of a strip of the annunciator or drops, Fig. 2 a front elevation, Fig. 3 a side elevation of a single drop and Fig. 4 a longitudinal section of the same. The drop coils *2* are wound on the cores *3*, as shown. the terminals being brought out at *2a*. The armature *20* is pivoted between the magnet cores by means of the screw, *16*. The drop catch *21* is made of brass and is fastened to the under side of the armature. The armature is polarized by means of the permanent magnet *8*, in such a way that current passing through the drop coils causes the armature to move toward the upper core, thus releasing the drop shutter. The shutter catch extends through the shutter, and its end is bevelled so that upon restoring the shutter the armature is pulled away from the upper core, thus preventing the armature from sticking.



TELEPHONE TRANSMITTER.

Mathias Weisser, of Milwaukee, Wis., patents (No. 732,147) a telephone transmitter. The object of this invention is to obtain a transmitter in which the metallic diaphragm is insulated from the transmitter casing and carbon electrode and forms no part of the transmitter circuit. This insulation is accomplished by means of the annular collar *j* formed of insulating material, and also by means of the insulating disk *L* which separates the metallic diaphragm *I* from the carbon diaphragm *K*. The granular carbon of the transmitter is contained between the diaphragm *K* and the carbon block *E*, the yielding cushion *S* serving to keep the carbon from falling out. The branch *N* of the circuit is held in contact with the carbon diaphragm by one of the elastic arms *P*, three such arms being used to hold the diaphragm in place. The other branch *O* is connected to any metallic part of the transmitter in electrical contact with the bearings of the block *E*.

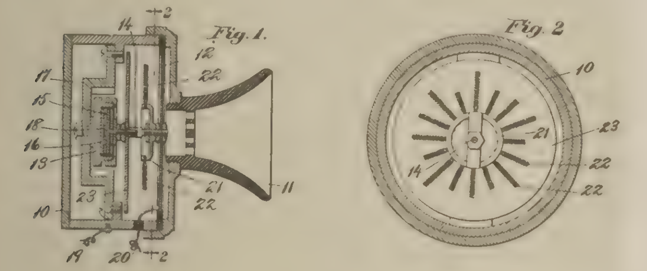
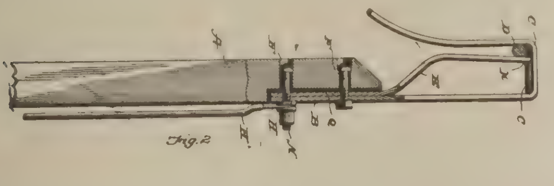


Fig. 2 shows a rear view of the transmitter with the shell removed.

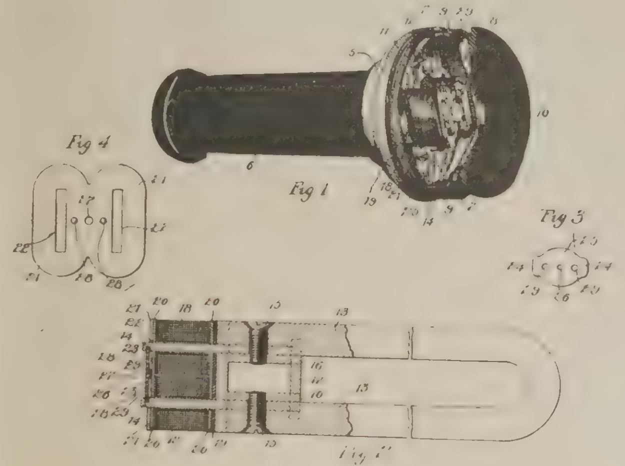
TELEPHONE LINE CONTACT APPARATUS.

Joseph P. Werner, of Clifton Forge, and William H. Silvey, of Lowmoor, Va., patent (No. 733,782) a telephone line contact apparatus. The object of this invention is to provide means for connecting an instrument to a telephone line at any point along its length. The arrangement of the device is shown in Fig. 2, in which *A* designates a pole to which is fastened a metallic plate *B*, which has its upper end bent so as to form a hook, as shown at *C*. A clamping bar *E* is fastened to the pole, as shown, its end is grooved at *K*, and is guided by the bar C^1. The wire leading to the telephone is fastened, as shown at *H*. To connect to the line the hook *C* is passed over the line wire and the wire gripped between the plates *B* and *E*, as shown in the figure, which gives the desired connection.



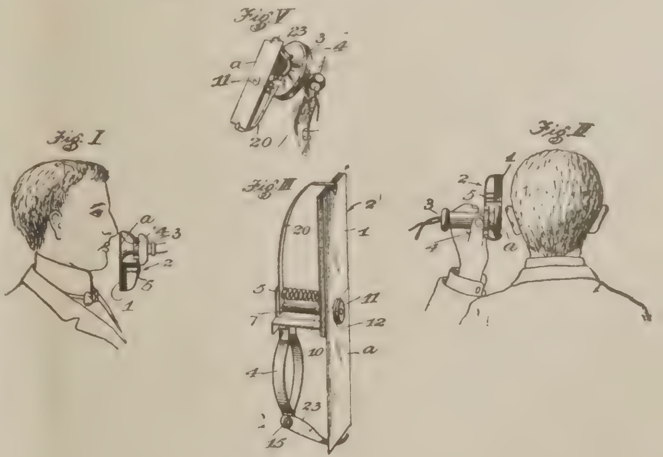
TELEPHONE RECEIVER.

John S. Goldberg, of Chicago, Ill., patents (No. 732,734) a telephone receiver, and assigns his patent to the Stromberg-Carlson Telephone Manufacturing Company, of Rochester and New York City. The object of this invention is to provide a telephone receiver in which the magnet coils can be easily and quickly removed. The construction of the receiver is shown in Figs. 1 and 2, and presents no unusual feature. A metal washer, shown in Fig. 4, is fitted over the cores *14, 14*, and serves to hold the coils in place. The inner faces of the cores are slotted at *23*, and are adapted to engage the ears of the metal button, shown in Fig. 3. This button is stamped from a sheet of metal in such a way that a circular depression, *26*, is formed on its lower side, which fits in opening *27* of the washer, shown in Fig. 4, and serves to pivot the button upon the washer and keep it in a central position. The manner in which the coils are held in place is clearly shown in Fig. 1. It will be seen that the removal of the fastening button is easily affected.



RECEIVER AND TRANSMITTER GUARD.

Samuel J. Ballard, of Los Angeles, Cal., patents (No. 732,915) a guard for speech receivers and transmitters, and assigns three-fourths of his patent to Calvin W. Brown. This guard, the application of which is shown in Figs. 1, 2 and 5, is constructed so that it may be fastened to telephone transmitters or receivers and used in the manner shown in the figure. Fig. 3 shows a perspective view of the device ready for attachment, in which *1* indicates a number of protecting slips or sheets of paper; *2* indicates a holder for these sheets. The paper is secured to the holder by means of the washer *11* and the arm *20*.



The Week's Messages.

FINANCIAL

GRAND RAPIDS, MICH.—At a meeting of the Citizens' Telephone Company the usual quarterly dividend of 2 per cent. was declared.

YORK, NEB.—At a meeting of the directors of the York Independent Telephone Company the report of the treasurer showed net earnings for the past six months of about 5 per cent. The net dividends paid by this company have been from 12 to 18 per cent., besides setting aside earnings for maintenance account.

JACKSON CENTER, O.—The Jackson Center Telephone Company has increased its capital stock from $12,000 to $25,000. W. H. Fledderjohan is the president.

FRANCHISES

PHOENIX, GA.—The Columbus Automatic Telephone Company has been granted a franchise by the city council.

CHEBANSE, ILL.—The city council has granted a franchise to the Local Telephone Company.

JERSEYVILLE, ILL.—The Illinois Telephone Company has petitioned the city council to grant a franchise giving the company the right to erect poles, make connections and establish a toll station. Action on the petition was deferred until the next meeting of the council.

KOKOMO, IND.—At a council meeting the Citizens' Telephone Company was granted a forty-year extension of franchise on condition that all wires be laid underground. The company accepted and underground wires will be maintained. The Citizens' Company has 2,500 subscribers and the Bell Company 400.

MUSCATINE, IA.—The Johnson County Telephone Company's franchise has been read in the council and referred to the committee on ordinances. If the matter goes through, the Iowa City Company will establish a plant, exchange and underground wires in Muscatine.

OGDEN, IA.—Local citizens at a special election voted in favor of granting a franchise to the Marcy Independent Telephone Company.

ELECTIONS

LYONS, IND.—The Lyons Co-operative Telephone Company has elected John Davidson, president; Dr. B. F. Chambers, vice-president, and S. N. Yeoman, secretary.

SALEM, IND.—The stockholders of the Hoosier Telephone Company have elected the following directors: H. Fisher, J. Stratton, W. H. Rudder, K. G. Davis, A. Colzlazier, M. B. Hottel and G. M. Morris.

SHOALS, IND.—The stockholders of the Shoals, Indian Springs and Bedford Telephone Company have elected the following officers: A. H. Farris, G. McDermid, A. A. Thompson and E. Dillman, and as directors M. Dillman, A. A. Thompson, B. C. Johnson, F. Lemmon, H. E. Monical and C. E. Henshaw.

DES MOINES, IA.—The directors of the Mutual Telephone Company have elected officers and discussed plans for the future of the company. At a conference of the stockholders it was suggested that the common stock be placed in the hands of the city council, or else in the hands of trustees, that it may have a voice in the management. A finance committee was appointed to at once make arrangements to float a loan for the improvements contemplated. At the meeting of the directors J. S. Bellamy, of Knoxville, who has been vice-president and head of the company, was made president and F. C. Hubbell vice-president.

JACKSON, MICH.—At a meeting of the board of directors of the Citizens' Telephone Company the following officers were elected: J. C. Richardson, president; Z. C. Eldred, vice-president; E. B. Fisher, of Grand Rapids, secretary and treasurer; C. E. Tarte, of Grand Rapids, general manager, and H. A. Douglas, manager. An executive committee was appointed, composed of the president, the secretary and treasurer and Messrs. C. E. Tarte, W. J. Stuart and J. H. Fildew.

MEREDITH, N. H.—The Citizens' Telephone Company has elected these officers: J. Ashnan, A. W. Abbott, W. B. Fellows, H. J. Odell, J. H. Dow, V. Hazerick, H. Bickford and T. Prescott.

GLEN FALLS, N. Y.—At the annual meeting of the stockholders of the New Union Telephone Company these directors were elected: D. L. Robertson, W. A. Huppuch, J. E. Flood, C. W. Cool, Myron Davis, Edward Davis, W. D. Bernard, W. M. Haskell, W. F. Bentley; inspectors of election, Myron Davis, W. L. Burk. The directors met subsequently and elected these officers: C. W. Cool, president; Edward Davis, vice-president; D. L. Robertson, secretary and treasurer.

JAMESTOWN, N. Y.—The stockholders of the Home Telephone Company have elected the following board of directors: T. S. Lane, P. H. Hoyt, E. P. Putnam, M. M. Skiff, W. J. Haddox, B. D. Phillips, J. Vautrot, Jr., C. H. Selvey, G. B. Devoe, R. T. Izant and C. C. Clawson.

YANKTON, S. D.—The Yankton Telephone Company has elected the following officers: Board of directors, W. H. Edmunds and W. H. Crumb, re-elected. R. H. Jones was elected on the board and also to the office of vice-president. Fred Schnauber was elected president; F. L. Van Tassel, secretary, and W. H. Edwards, treasurer.

BOLTONVILLE, VT.—The Boltonville Telephone Company has elected the following officers: H. E. Sargent, president; Samuel Tucker, vice-president; Edwin Henderson, secretary and treasurer; Allen Tewksbury, Samuel Tuttle and George Bailey, executive committee. The work of running wires and erecting poles between Boltonville and Newbury has already been commenced.

ILION, N. Y.—The Herkimer County Independent Telephone Company is overhauling its switchboards at Ilion, Herkimer, Mohawk and Frankfort by placing in new keys and enlarging the capacity of each. Altogether there are 100 subscribers waiting to be connected. At the present time the company has 1,000 telephones in working order. Prior to the entrance of the Independent Company the Bell people had 180, but now the latter company only has seven and four of this sumber are free. The changes in the switchboards will better the service. The company has a traveling chief operator, Miss Davis, of Ilion, who looks after the service.

LE ROY, N. Y.—The Inter-Ocean Telephone Company has opened its new local exchange. The company is contemplating the organization of a local company and is endeavoring to interest Le Roy capital.

COMBINATIONS

DAYTONA, FLA.—The property and franchise of the Daytona Telephone Company has been sold at sheriff's sale. It was bid in by the trustee, Fred. Conrad, for $2,521.15. It is said that the company will be reorganized and the business carried on without interruption.

DUBLIN, GA.—The Dublin telephone exchange and the long distance telephone lines, including the lines to Sandersville, Wrightsville, Tennille and Kittrell, the line to Adrian and the line to Macon and Dexter have been purchased by the Dublin Telephone Company, which is composed principally of Messrs. Malcom D. Jones, of Macon, and F. F. Scarborough, of Dublin.

MADISON, WIS.—L. W. Burch, president of the Electrical Supply Company, has purchased the Rock River Telephone Company, which holds a franchise enabling it to build a telephone line to Jefferson, and also operates an exchange there. It is the intention of the new proprietor to do this at once.

PERSONAL.

BOWLING GREEN, O.—Earl Zoll, manager of the local Independent telephone company, has resigned, and Irving W. Pope, auditor for the Federal Telephone Company, of Cleveland, and general manager of the company's plant at Findlay, will look after the business for his company here.

PHILADELPHIA, PA.—John M. Mack has been appointed president pro tem. of the Keystone Telephone Company owing to the illness of Mr. Foerderer.

THE WEEK'S MESSAGES—Concluded

TEXARKANA, TEX.—H. A. Brinkerhoff, manager of the new local telephone system, has resigned his position. He will be succeeded by J. D. Kiddo.

UNDERGROUND

BROOKLINE, MASS.—It has been voted to grant the petition of the New England Telephone and Telegraph Company of Massachusetts for permission to lay and maintain underground conduits.

GRAND RAPIDS, MICH.—C. E. Tarte and Albert Stacey, of the Citizens' Telephone Company, are in Battle Creek for the purpose of looking over conditions in the Calhoun county exchange and making arrangements for the installation of the underground system.

KINGSTON, ONT.—Terms have been arranged between the council and the Bell Telephone Company as to placing wires underground. The company, in return for the privileges, gets a five years' contract for the use of the streets, pays $500 a year and three free telephones, and promises no higher rates than $25 and $30 during the life of the contract.

WILLIAMSTOWN, PA.—Monroe township committee is considering an ordinance giving the Interstate Telephone Company a franchise to lay underground wires in Williamstown.

MONTREAL, QUE.—The conduit committee, at its last meeting decided to proceed with the work of preparing plans and estimates for a civic conduit system. Alderman Martineau, the chairman, strongly advocated this move as the first practical step towards the accomplishment of the scheme. Until it was known just how extensive a system was proposed, and exactly what the expense would be, it would be impossible for the companies to decide what position they would take. All of the members agreed that it was desirable to engage the services of an engineer experienced in electrical conduit laying to take charge of the work of preparing the plans and specifications. Several recommendations for the appointment were made, but it was decided to secure the services of Mr. Charles E. Phelps, of Baltimore, who is an acknowledged authority on railway construction in the United States. Mr. Phelps will be communicated with at once, and will probably be in Montreal during the course of a week. The amount of preliminary work is so large that it is considered necessary to have a local engineer work in conjunction with Mr. Phelps, but he will not be chosen before the latter has had a talk with the committee. Letters were read from the Montreal Street Railway Telegraph Company, the Merchants' Telephone Company, the Canadian Pacific Railway Company, the Bell Telephone Company, and the Montreal Light, Heat and Power Company, regarding the purpose of the meeting. The Bell Telephone Company informed the committee that Mr. J. A. Baylis would act as its engineer in co-operation with the civic engineer.

MISCELLANEOUS

LOGANSPORT, IND.—The Home Telephone Company and the Case County Telephone Construction Company have effected a reorganization of the company, which is now composed solely of Logansport men. The Fort Wayne parties have sold their interests. The capital stock has been increased to $350,000.

BOSTON, MASS.—The American Telephone and Telegraph Company's monthly statement of the output of instruments for the month ended June 30 and the fiscal year to date, with comparisons, follows:

June—	1903.	1902.	1901.	1900.
Gross output	87,608	96,653	96,300	55,613
Returned	42,189	41,741	34,221	25,671
Net output	45,419	54,912	62,079	29,942
Dec. 21 to June 30—				
Gross output	600,064	589,109	469,923	346,146
Returned	235,141	226,267	194,569	132,660
Net output	364,923	362,842	275,354	213,486
Total outstanding	3,515,243	2,888,852	2,228,170	1,793,878

New Construction in the Field

BIRMINGHAM, ALA.—The People's Home Telephone Company is building a line to Hueytown.

KINARD, ILL.—The Pittman-Pettijohn Telephone Company is extending its lines to connect with Johnsonville, Orchardville, Round Prairie, Wayne City, Enterprise, Mount Erie, Flora and Clay City.

ALEXANDRIA, IND.—The Delaware and Madison County Telephone Company has completed a direct toll line, connecting their systems in Delaware and Madison counties with Marion, touching the towns of Summitville, Fairmount and Jonesboro.

HAWARDEN, IA.—The Hawarden Telephone Company will extend its lines to all parts of the county.

SLOAN, IA.—The North Telephone Company will build rural telephone lines out of Sloan. It is expected to construct lines north of Sloan to the Manley Corners, northeast to Owego and northwest into Lakeport township.

WEST POINT, IA.—From West Point the German-American Telephone Company will build lines to Lowell, Montrose and Fort Madison.

COLBY, KAN.—The Colby Telephone Company has placed an order for a new switchboard. They are extending lines over the entire county.

OBERLIN, KAN.—The Central States Telephone Company, of Oberlin, has purchased the automatic exchange at Norton, Kan., and has ordered a new switchboard to replace the automatic.

ELIZABETHTOWN, KY.—The Hardin County Telephone Company will add a number of improvements to its lines in the near future.

FREDERICK, MD.—The Frederick County Telephone Company is at work on an extension of its lines from Libertytown to Unionville.

ATLANTA, MICH.—J. Ficklin contemplates putting in a telephone line here to Gaylord to connect with the Alpena line here.

WINONA, MINN.—The Winona Telephone Company will construct a new line between the towns of Mt. Vernon and Rollingstone.

EDGAR, NEB.—The Edgar Telephone Company is about to install a new central equipment, which has become necessary in order to take care of the rural lines.

LOWVILLE, N. Y.—The Black River Telephone Company is to run a line from Lowville to Gardiner's Corners.

SCHENECTADY, N. Y.—The Home Telephone Company of Schenectady is making rapid progress on its line from Schenectady to Amsterdam, in which city connections will be made with the automatic company and the Glen Telephone Company.

BERGHOLZ, O.—The Bergholz Telephone Company will install an exchange in Carrollton. The officers of the company are: L. W. Steinmetz, president; R. G. McLaughlin, general manager; A. G. McBane, secretary-treasurer, who with W. E. Steinmetz, J. W. and S. G. Carson, Ernest Favri, W. G. Donaldson and James McBane, compose the board of directors.

DILLONVALE, O.—The Vigilant Telephone Company of Dillonvale is getting in shape to do business. They are now connected up so they can get connection with Smithfield and beyond to Bloomfield.

WESTCHESTER, PA.—The Eastern Telephone Manufacturing Company is having plans prepared for an addition to its factory at West Chester, and new equipment will be needed.

HOPE VALLEY, R. I.—The Hope Valley Automatic Telephone Company has completed its system.

OGDEN, UTAH.—The Utah Independent Home Telephone Company has purchased a lot, on which it intends to erect a two-story business block for its Ogden exchange and rental purposes.

PETERSBURG, VA.—The Petersburg Telephone Company has acquired the right of way from the Manchester and Petersburg turnpike to Chesterfield, and the telephone line is about to be constructed.

SHELDON, N. D.—Charles C. Dalrymple, of Tower City, will build an exchange here. The board has granted Mr. Dalrymple permission to erect poles and string wires under its supervision.

MEDICINE LODGE, KAN.—The Medicine Lodge Telephone Company's line to Sun City has been completed. This company now has lines connecting Medicine Lodge, Lake City, Sun City, Coats and Mingona. The line will be pushed on from Sun City to Coldwater and perhaps to Bucklin and Dodge City. It will probably build a line from this city to Isabel during the summer.

OBERLIN, KAN.—The Oberlin Telephone Company will complete the new lines up the Sappa at once.

VLIETS, KAN.—The Vliets Northwestern Telephone Company has connected its line with the switchboard at Vliets.

WELLSVILLE, KAN.—Arrangements have been made by the Johnson County Telephone Company and the Wellsville Telephone Company for the joint construction of a line between Edgerton and Wellsville.

SOUTH PARIS, ME.—The Curtis Hill & Paris Telephone & Telegraph Company has extended its wires to South Paris.

UNITY, ME.—The Unity Telephone Company is constructing a line to Hampden.

MANKATO, MINN.—The Citizens' Telephone Company is extending a line from Mankato to Windom.

TRADE NOTES

The Franklin Rolling Mill and Foundry Company has established at Franklin, Venango County, Pa., a perfectly equipped and modern plant for the manufacture of various iron and steel products. The plant is now operating and ready for business. It comprises, first, a steel pole department; second, a rolling mill; third, a malleable iron foundry; fourth, a gray iron foundry; fifth, a steel and iron rivet department. Each department is equipped with the latest and most improved labor-saving apparatus known, which enables it to turn out the highest grade of merchandise at the lowest market price.

Telephone companies will especially be interested in the tripartite steel pole department, which has been established by the company to fill a long felt and growing want for an economical steel pole, as wood poles are becoming scarcer and growing in price each year. The company is the sole owner of the basic patents covering the construction of this pole and are the only manufacturers of it. They have been able to reduce the cost to a figure which is very close to that of the wood pole, while at the same time the Tripartite is the best metal pole for overhead construction in the market. The question of strain has been taken up and the company can construct a pole suitable to withstand any desired strain, so that the purchaser does not pay for more metal than is actually required for the service specified. There is no better pole in the market to-day and it should receive the careful consideration of engineers in the market for poles, for any of the following purposes: Trolley lines, electric railways, power transmission lines, electric light installations, telephone lines, telegraph lines, signal posts or semaphores.

The advantages of this pole over those of wood are simplicity of construction, strength, elasticity and economy in first cost and installing. These poles are much lighter than those of wood, therefore the freight rates, cartage and labor of handling are cheaper. The poles are set in three feet of concrete for a minimum and for longer and heavier poles one-tenth of the length of pole set in the ground insures a positive anchorage. The resistance from wind pressure is small as the poles are open. They can be painted internally as well as externally, which will insure a life longer than that of any other type. The poles are of high carbon steel and will "red rust," but will not scale when neglected. A number of these poles have been tested in actual service for several years for their different uses, under the observation of engineers of the several industries and they all have expressed themselves perfectly satisfied and concede that all the claims of the company have been fully sustained. So the company is now convinced that it has perfected the cheapest and best pole ever offered and are prepared to guarantee it in every way. They will contract for all overhead construction with any company so desiring.

The rolling mill produces high grade rolled steel in shapes and sizes suitable for light structural work. They make a section, "U" shape, which is new and adaptable for many uses. This section is rolled from old steel rails and is high carbon, running from thirty to forty points, which gives it strength and elasticity. This particular section is used in the construction of the tripartite steel pole for all overhead construction. This department is equipped with all known labor-saving devices for converting steel from the billet or rail to the finished product without a second handling. The steel goes in at one end of the mill in the crude state and out of the other finished. The capacity of this department is about eighty tons daily. The malleable iron department is equipped with the latest and most improved refined air furnaces, which produce the purest and highest grade iron. The annealing ovens are so arranged as to insure perfect annealing of all suitable sizes, from the smallest to the largest. The capacity of this department is about twenty-five tons daily. The gray iron department, with the most improved cupola known, has a capacity of pouring about fifty tons daily, has ample floor space and is capable of handling any size of casting. Very heavy travelling cranes are in use in this department. Only the highest grade of gray iron is produced here. The steel and iron rivet department is equipped with the most improved furnaces and automatic machines in the market.

The National Steel and Wire Company is one of the few independent corporations now in the field manufacturing telegraph and telephone wires, wire rods, wire, wire rope, field fencing and other wire specialties. Their business is being conducted along the old-fashioned lines of personal interest in their customers, and they have been received most cordially by the consumers of their products. Altogether this company occupies an exceedingly strong position. They make only the highest grades of product, are not antagonistic to any other interests; but are simply supplying the demand of the users of high-class wire specialties, which it is impossible to obtain from the large companies, who look largely for tonnage and who do not give the personal attention to each buyer that is necessary in the prper handling of such business. The company operates four plants—the National Wire Corporation, New Haven, Conn.; the Union Fence Company, DeKalb, Ill.; the Pacific Steel and Wire Company, San Francisco, Cal., and the DeKalb Fence Company, DeKalb, Ill.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

CONTROLLING INTEREST in Central Iowa—The controlling interest of a fine telephone system, with good opportunity to increase the business. No opposition and paying 20 per cent. on the investment. Poor health reason for selling. Write for particulars. HARDING INVESTMENT CO., Room 304, Good Block, Des Moines, Iowa.

COUNTRY TELEPHONE SYSTEM in Illinois.—This is a rare chance for the right party, it includes: Franchises. nine exchanges and nearly 100 miles of metallic toll line. Address BOX 62, care The American Telephone Journal, New York.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

SALESMAN—Wanted, experienced telephone and switchboard salesman. One with established Northwestern trade preferred. No applications considered except those giving full particulars. Address BOX 65, The American Telephone Journal, New York.

POSITION—Wanted, position as manager or wire chief. Five years' experience on inside and outside work. Thoroughly understands central-energy and magneto systems. Best of references. Address BOX 66, The American Telephone Journal, New York.

POSITION—All around, temperate telephone man, with 16 years' experience as inspector, lineman, cableman, wire chief, underground inspector, construction and maintainence foreman, manager and superintendent, wants position in Ohio or Indiana. Salary moderate. Address ELECTRICIAN, Box 323, Malvern, Iowa.

ELECTRICIAN—A first-class electrician wanted who thoroughly understands his business and who is competent to take full charge and care of an exchange of 600 subscribers; must be a good man; none other need apply. Address Washington Telephone Company, Washington, Iowa.

EXCHANGE WANTED—Would like to purchase a telephone exchange in a good live town; one in the west preferred. Writer would accept a position as manager of an exchange. Address BOX 63, The American Telephone Journal.

POSITION.—Competent telephone man desires position; six years' experience in both inside and outside work. Thoroughly understands common battery and magneto systems. Best of references. Address BOX 60, care The American Telephone Journal, New York.

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The American Telephone Journal

VOLUME VIII *SATURDAY, AUGUST 1, 1903* *NUMBER 5*

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DIFFICULTIES OF CABLE MAINTENANCE IN LARGE CITIES

By Clayton Traverst.

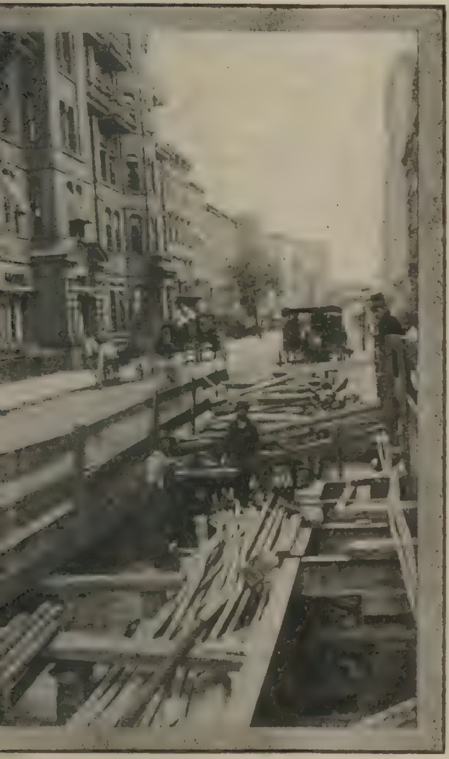

Fig. 1—View along Eighteenth Street.

IN large cities where telephone companies maintain networks of underground cables; if excavations be made in the same street with the underground system it usually means considerable expense, trouble and worry for the telephone company. Probably nowhere in the country has a telephone company had more to contend with in this line than the one operating in New York. Whereever excavations for the subway were made on streets where there were telephone cables, the conduits were laid bare by the excavators as the cut was dug. In some cases it was possible to support the conduit intact by means of chains and steel cables hung from heavy beams laid across the excavation. In many cases it was not practicable to do this either, on account of there not being enough room available to install the vitrified conduit between the surface of the street and the root of the subway, or on account of the cement which held the conduit cracking and allowing the conduit to sag. In either of these cases the clay ducts were broken from around the cables, and they were allowed to hang in space, as shown in the photographs, being supported in whatever way seemed most expedient. The photographs illustrate such a condition as the one described. The location of this excavation is Fourth avenue and Eighteenth street.

Fig. 1 shows a view looking east along Eighteenth street. To the right of the picture one may look down into what is to be a subway station. The sidewalk will cover this when the work has been completed. Laying along on the roof of the subway station are the telephone cables. There are 48 of them in all. Of this number a majority are 200 pair cables, but there are also some 400 pair and 100 pair. A total of 10,000 conductors are contained in the cables shown. Before the subway operations, all of these cables were carried in vitrified clay ducts, but when it became necessary to excavate for the subway the ducts were broken from the cables and they were left in the condition shown. The subway railroad station is now almost complete under them.

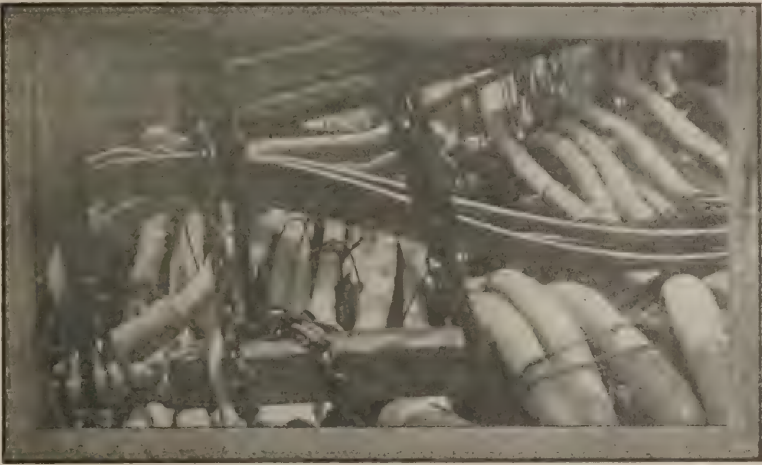

Fig. 2—Cables hanging on temporary supports.

A manhole is under construction at the point where the farthest man is standing and another one is being built about 225 feet farther down the street. It is the intention of the company to splice in new lengths of cable for this distance. The new cable will be carried in steel pipe conduit, which is being installed. Some of the lengths of pipe of which this conduit is composed are seen laying on the falsework in the foreground of the photograph. Conduit of this class is made by joining with the ordinary pipe coupling, lengths of steel pipe. Care is taken to first see that the inside of the pipe contains no slivers of metal which might injure the lead sheath of the cable. The pipes are also

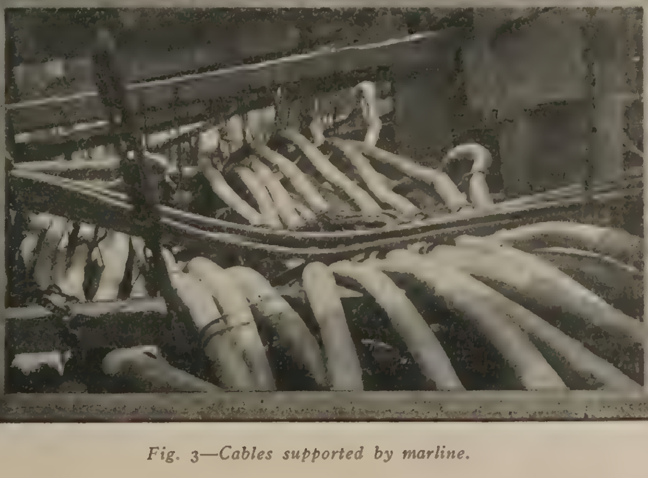

Fig. 3—Cables supported by marline.

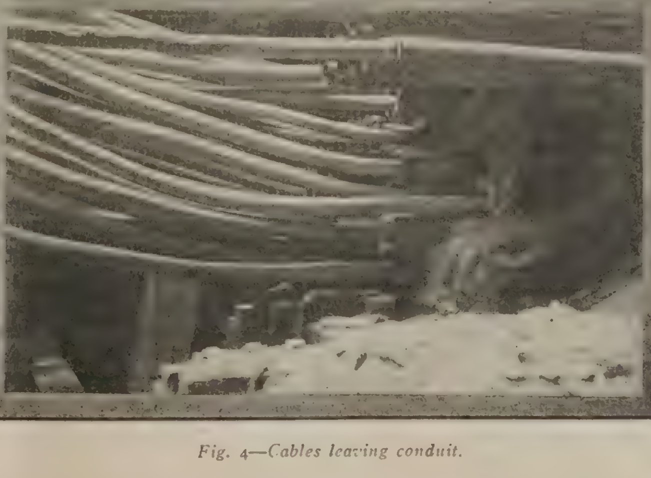

Fig. 4—Cables leaving conduit.

filed smooth at the ends on the inside where they have been threaded so that there will be no rough burrs that might tear the cable. Conduit of steel pipe has the advantage of great flexibility. It can be bent into almost any shape. It takes up much less room than vitrified conduit and will not break at the joints as the vitrified will if the earth around it settles. It has the disadvantage, however, of higher cost. In laying this conduit the pipes are put in place and carefully arranged, after which cement is tamped around them, which serves to protect them and hold them in their correct positions. Three-inch pipe is used.

Figs. 2 and 3 show how the cable was supported temporarily while the construction of the subway station underneath was being carried on. The chains support wooden beams on which the cables are allowed to lie. Farther back the cables are supported from another beam by pieces of marline. Fig. 4 shows the cables where they come out of the conduit before taking the aerial span. Some of the pipe conduit which is already in use may be seen near the top of the photograph. A portion of the unfinished manhole is visible to the left. The telephone company keeps a man constantly on duty at this point, who is capable of making any splices or repairs in the cable that an emergency might demand. The breaking of one of the large cable sheaths on a rainy day might put 200 telephones in trouble, so an accident of this kind has to be carefully watched for and every precaution taken so that a speedy repair could be made of any trouble that might occur.

SIMULTANEOUS TELEGRAPHY AND TELEPHONY*

By E. M. Fisher.

SIMULTANEOUS telegraphy and telephony, or as it is commercially known, "composite" transmission, is one of the most important, and possibly, just at this time, the most interesting subject that can come to the attention of the telephone engineer. It is a subject of vital importance to wire chiefs and managers, and even toll operators will become more and more involved in the manipulation of the composite apparatus if not in its theory.

Before describing the apparatus and its arrangement by which a metallic circuit can be used simultaneously as two independent telegraph circuits and a telephone talking circuit, it would be well to consider the fundamental principles underlying the accomplishment of an undertaking apparently so impossible. First we will consider the simple "Morse" or telegraph circuit. Fig. 1 shows the apparatus and connections used in this country for the manual transmission of telegrams. In this circuit the ground is used as a return. When both keys K are closed, the current from the main battery MB flows through both relays R, R in the line, returning through the ground. The armatures are drawn toward the energized cores of the relays, closing the contacts C in the local circuit, which causes the sounders S to repeat or magnify the opening and closing of the relays. It is readily seen that the relay and sounder will now simply reflect the movement of the key, consequently, the Morse character will be transmitted through the key to the sounder at the distant office where it can be read by the operator.

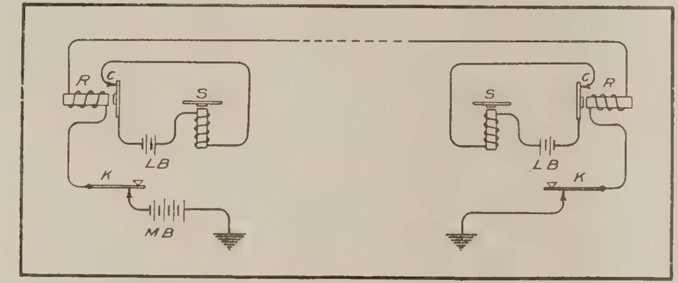

Fig. 1.

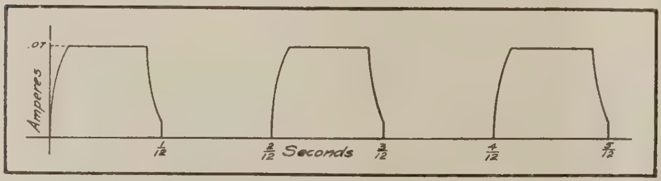

Fig. 2.

Van Rysselberghe's composite system employs two telegraph circuits as illustrated in Fig. 1, out of which he evolves a metallic telephone circuit. Before entering on an explanation of this system, it would be well to study the characteristics of the electric waves of both the telegraph and telephone currents. The apparatus in the first system responds to a direct current, and that in the latter to an alternating current. The success of simultaneous telegraphy and telephony depends upon the non-interference of these superimposed waves of direct and alternating current, therefore the first necessity is to understand the characteristics of the different currents and their effects upon the apparatus. In operating the telegraph circuit described above at a speed of thirty words per minute, the key would be opened and closed about six times per second, in other words, the current from the battery flows to the line and ceases to flow six times in each second, and consequently the current increases from zero to a maximum remaining there less than 1-12 of a second, and decreases from maximum to zero, remaining there less than 1-12 of a second.

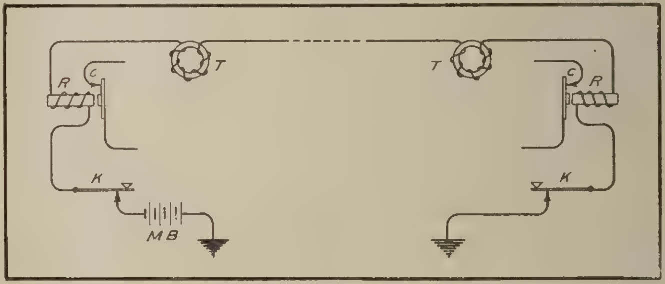

Fig. 3.

The time required for the current to reach its maximum or vice versa, does not depend upon the rapidity of the opening and closing of the key, but upon the electrostatic capacity, the self-inductance and resistance of the circuit into which the current flows. In the telegraph circuit the electrostatic capacity and self-inductance are practically negligible, and the current would rise and fall almost instantly. In fact so rapid is the rate of rise from zero to maximum that it requires less than 1-50th of the time required to make a telegraph dot, even in a circuit two hundred miles long.

The lowest audible musical sound is produced by vibrations moving at the rate of about fifteen per second, and consequently any wave moving at a higher rate of speed than fifteen per second would produce a sound in a telephone receiver. It, therefore, follows that as the telegraph wave moves at a rate in excess of the lowest sound wave, it would produce a sound in a telephone receiver. Fig. 2 illustrates the characteristic of the telegraph wave. The time of the wave is plotted along the line AT, and the current along the line AC, the maximum current is represented as seventy milliamperes. The point A represents the period of closing the key, and the current wave rises in something like the slightly curved rising line. The current remains at maximum, until the key is opened, when it falls to zero, in a little different curve than the rising curve. It remains at zero until the key is

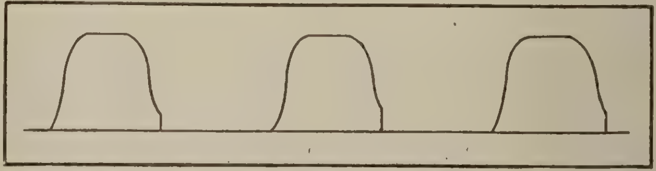

Fig. 4.

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*Abstract of paper by Mr. E. M. Fisher, of The Cumberland Telephone and Telegraph Company.

again closed, when another wave like the first is made. The length of the crest or the maximum period of the wave depends upon the length of time the key remains closed. As explained, the telegraph wave, when the electrostatic capacity and self-inductance in the circuit are negligible, rises and falls at a rate rapid enough to produce a sound in a telephone receiver, and, therefore, to successfully operate a telephone on such a circuit we must in some way change the character of the Morse wave, and at the same time, not destroy its usefulness.

The time required for a current to reach its maximum depends upon the quantities electrostatic capacity, self-inductance and resistance in the circuit, or T varies as $\frac{L}{R}$ or time varies as the inductance divided by the resistance. By this equation, to increase the time, we must either increase the inductance or reduce the resistance, or do both.

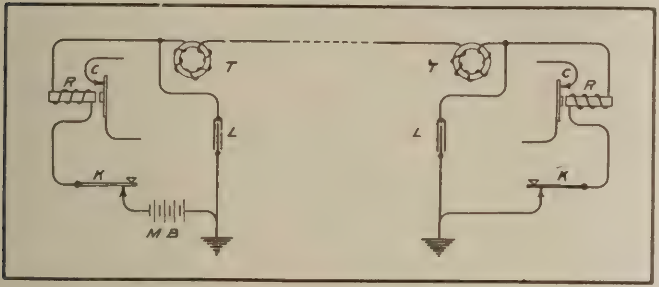


Fig. 5.

In a given circuit we cannot reduce the resistance therefore, we are compelled to increase the inductance. Fig. 3 shows the introduction in the telegraph circuit of coils of wire wound on a soft iron ring. The local circuit on the relay point is omitted to simplify the illustration. Current flowing through the convolutions around the ring of iron will produce a counter or opposing current. The reason for this is as follows: The current in passing around the iron ring through the turns of wire creates in the iron ring lines of force which increase as the current increases. This *increasing* of the number of lines of force creates or generates in the turns of wire a counter or opposing current, which is proportional to the *rate* at which the lines of force are *increasing*, therefore the initial current and counter current reach their maximum values gradually and not instantly. When the key is opened the lines of force rapidly decrease. This rapid decrease of the lines of force in the iron ring produces a current in the coil of wire, but this time it is in the *same* direction as the initial current, and tends to retard its fall.

The inductance or counter E.M.F. in such a coil (called impedance retardation or choke coil) increases as the square of the number of turns of wire on the iron ring, while the resistance increases only as the number of turns, consequently we rapidly increase the ratio $\frac{L}{R}$ and, therefore, we are able to introduce considerable inductance in the circuit without introducing too great a resistance.

The introduction of this impedance coil in the circuit has now changed the characteristic of the Morse wave and its rise and fall is not at so rapid a rate, being something like that in Fig. 4. It would be possible to design an independance coil that would so distort the Morse wave as to prevent its intereference with the telephone receiver, but it is also possible by introducing too much impedance to so flatten the Morse wave that its efficiency is destroyed.

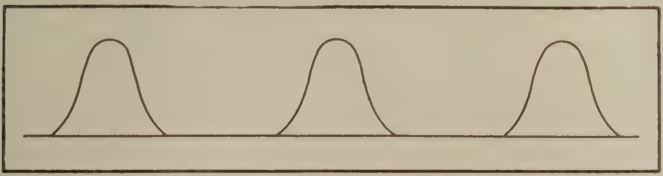


Fig. 6.

Another medium used in retarding the rate of the Morse wave is the condenser. In Fig. 5 condensers are shown connected across the circuit to ground. It now remains to see what effect these condensers will have. When the key is closed the current flows to line, but the two condensers must become fully charged before the current can reach its maximum in the line, and again we introduce delay in the rise of the current. When the key is opened the condensers tend to discharge their current into the line, but the discharge is in the direction of the charging current, and like the current caused by the breaking of the circuit in which there was an impedance coil, the current tends to retard the fall of the Morse wave.

Thus by the introduction of the impedance coils and condensers in the Morse circuit we have so flattened the telegraph current wave, that it assumes about the character illustrated in Fig. 6, and we have so reduced its rate of increase and decrease that at the speed of a telegraph operator the rate of vibration is below that of the lowest audible sound.

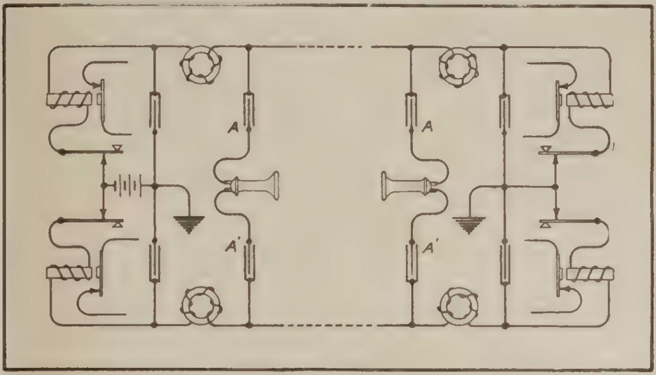


Fig. 7.

It is readily seen that it would be impossible to use the rapid automatic telegraph on a circuit wherein has been introduced such impedance to the telegraph wave, and also that there is a limit to the number of stations on such a Morse circuit, even if they are worked at the speed of a telegraph operator. In the first instance not enough impedance has been introduced to interfere with manual operation, but with rapid mechanical operation the current wave would not have time to rise to its maximum before another wave would follow and interfere. In the second instance by cutting in too many offices, each office requiring retardation coils and condensers, so much impedance would be introduced that soon even at the speed of manual operation one wave would follow too rapidly upon another.

Still another reason prohibits the use of the automatic telegraph. If it was possible for each wave to reach its maximum, the rapidity of the automatic sending would increase the rate of vibration to such a degree that possibly it would be at a rate high enough to produce an audible sound in the telephone receiver. If the telephone was bridged directly across the two Morse circuits with a metallic connection it would form a cross between the two Morse circuits and would also allow the undulating current to pass through the receiver, causing the diaphragm to respond to the impulses just as the relay and sounder in the Morse circuit. To prevent this the telephone circuit is bridged through condensers, as in Fig. 7.

A condenser will not allow a continuous current to pass through it. Its resistance to such a current is practically infinite, consequently the condenser has made the telephone circuit an "open" circuit to the Morse current. The Morse current, however, will be constantly charging and discharging the condensers, and these charges and discharges which pass through the receiver will cause the diaphragm to move back and forth, but the rate of change of the direct current is so slow it will not produce an audible sound.

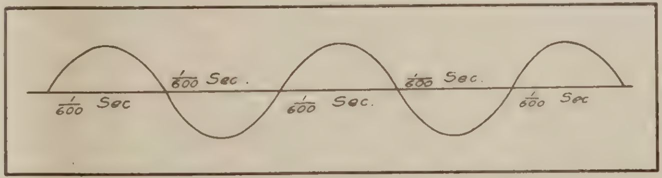


Fig. 8.

We have now considered and designed a circuit through which the direct current of the Morse system will flow which will operate the necessary relays and sounders for the transmission of telegrams and it remains to show that also we have built a telephone circuit over which the alternating current of telephone transmission will pass, going through the necessary telephone apparatus and not interfere with the undulating current of the Morse circuit.

We can safely say that if the alternating current of the telephone did pass freely through the telegraph relays its strength would be so small that it would not affect even the most sensitive telegraph relay.

However, if the alternating current did pass freely through the telegraph relays it would have easy access to the ground and both sides of the telephone circuit being grounded this would put a "shunt" directly across the line and possibly offer a better circuit for its flow than through the wire circuit to the other telephone station. Therefore, we see that it is absolutely necessary to prevent the alternating current from passing through the relay to the ground, and now we will see how the retardation coils introduced to flatten out the Morse impulses will act as an impedance to the alternating current, and prevents its going to ground.

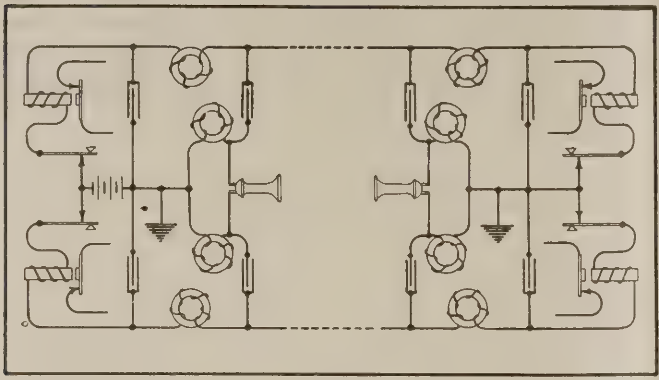


Fig. 9.

The resistance to the flow of an alternating current is called impedance. In a circuit over which a direct current is flowing the current is proportional to the electromotive force divided by the resistance, $I = \frac{E}{R}$, while for a simple alternating current the current is equal to $\frac{E}{\sqrt{R^2 + (2\pi n L)^2}}$ where E = electromotive force, R = resistance, $\pi = 3.1416$, n = number of periods or double vibrations per second, and L = inductance in henries of the whole circuit. The value of the expression $\sqrt{R^2 + (2\pi n L)^2}$ is the impedance of the circuit. It is evident from this expression that the impedance increases with the frequency n, and with the inductance L.

In the telegraph circuit through the retardation coil there were about 6 rises and falls in current per second, while in the ordinary telephone conversation there are about three hundred complete vibrations or periods per second of the sound waves or about one hundred times as many as in the Morse current. If in designing the retardation coil to flatten out the Morse wave at a frequency of six per second we have succeeded to such an extent that it has no effect on a receiver, we can readily appreciate the great impedance this retardation coil will offer to the alternating current, and consequently the line and receiver at the other end will offer an easier path to the flow of alternating current and most of it will follow that course.

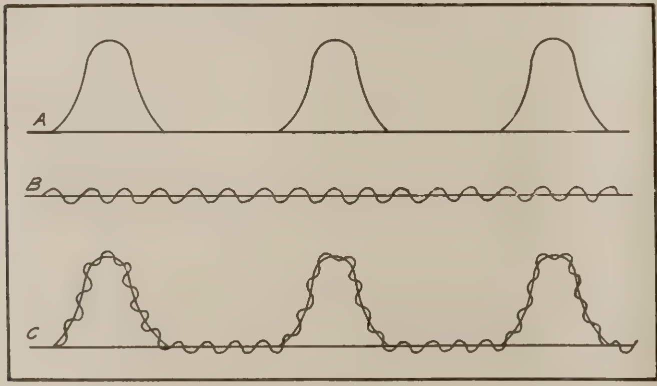


Fig. 10.

To more clearly explain "impedance" some explanation will be given. Fig. 8 shows approximately the character of an alternating current wave. It will be noticed that at all points of the period or cycle the current is either rising or falling above the line or falling and rising below the line. In noting the effect of the iron ring wound with coils of wire (retardation coil) while considering the Morse circuit we saw that a counter or opposing electromotive force was created by the rising and falling of the direct current and that this counter electromotive force was greatest at the point of the greatest rapidity of rise and fall and was only momentary in its flow. If the frequencies are slow the initial flow lasts longer than the counter E.M.F. and consequently passes through the coil in a flattened form. Suppose we increase the frequency of the initial flow until it died out on each impulse as quickly as the counter E.M.F. ceased, the result would be that no current would flow through the coil if the counter E.M.F. was at all times equal to the initial E.M.F., and to all practical effects that is what happens in the composite circuit. The retardation coil effectually blocks off the rapidly alternating current so that it is forced to flow through the line and receiver at the other end, thereby transmitting the telephone sound waves. The telegraph relay offers impedance to the alternating current, its electro-magnet being coils of wire around an iron core, and it also tends to prevent the alternating sound waves from passing to ground. Through the two effective impedances very little of the alternating current passes to ground, and consequently when we "composite" a metallic circuit we lose very little of the telephonic efficiency.

Only one point now remains where there might be interference between the telegraphic and telephonic use of the same metallic line. In Fig. 7 at the points marked A and A^1, it may be noted that it is possible for a high difference of potential to exist, the condenser A being charged from a high voltage current on the Morse circuit on its side of the line and the condenser A^1 with a high opposite potential from the Morse current on the other side. There would be a tendency for an equalization or levelling of this difference of potential through the receiver, possibly sufficient to produce a flutter in the receiver. To equalize this difference of potential we will shunt the receiver through low resistance retardation coils to ground. (See Fig. 9.) By this means the difference of potential is equalized, and at the same time the receiver is not shunted to the alternating current, as the retardation coils offer infinitely higher resistance to the alternating current than does the receiver; hence the alternating current takes the easiest course, passes through and actuates the receiver. Fig. 10 gives a graphical impression of how two current waves would pass over the line, A being the form of the telegraph current wave, B the form of the alternating voice wave, and C the superimposed waves.

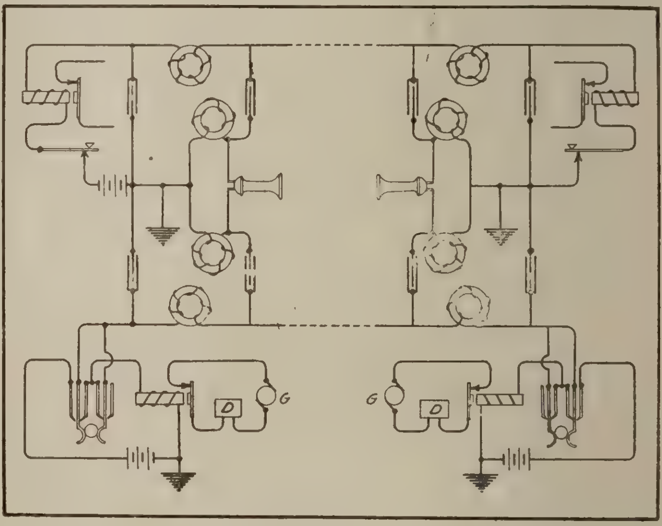


Fig. 11.

An arrangement has now been provided which will make two telegraph circuits and one metallic telephone circuit from a pair of wires. It remains to see if we can "ring" over such a circuit and if not, how we can accomplish a result so necessary. There have been many schemes and patents covering methods by which this end can be accomplished. We will discuss but one. The frequency of the alternating generator current is very low as compared with the frequency of the alternating telephone current, and the generator current will easily pass through the retardation coils and telegraph relays, and it might possibly be of enough strength to actuate the telegraph relay. This would seriously interfere with the telegraph signals and at the same time the greater portion of the generator current would flow to ground through the telegraph circuits, as they offer less resistance to the flow of current. Consequently not enough current would go to the distant office to actuate the drop.

A simple way to ring over a circuit is to give up one of the telegraph circuits for the purpose. This requires very little extra apparatus, but does require a special ringing key and drop for each circuit. Fig. 11 shows how the telegraph circuit is made a ringing circuit. It will be noted that there is no battery on the ringing circuit, but that both ends are grounded through the telegraph relays. Inserted in this circuit at either end is a spring key carrying on its outside spring a grounded battery. When the key is in normal position the circuit is through the shift and inside spring to the telegraph relay. When thrown it opens the relay circuit behind it and puts the grounded battery to line. This battery finds ground and completes its circuit through the key and relay at the distant office, and the distant relay responds, closing the local contact point. Instead of a local battery and sounder being in series with this contact point as in the telegraph circuit, a power generator and drop are inserted. When the contact point closes the generator circuit is completed, and the drop falls. When the key is released it again closes the relay circuit, making it complete for the distant office to ring through.

CUYAHOGA TO SHARE PROFITS WITH EMPLOYEES

THE following letter, which is self explanatory, has been issued to the employes of the Cuyahoga Telephone Company, of Cleveland, Ohio, by the president of the company, Frederick S. Dickson:

My Dear People:—I am not quite satisfied with your work. I do not think it is very bad, but I am sure it is not as good as it could be, and, therefore, it is not as good as it ought to be. You are doing pretty well, but you are not doing your very best.

You know this business was started so that it might earn money for those who invested money in it.

Now, money can be made out of this business if good service is rendered to our customers, but the character of our service will depend upon the character of your work. If your work is good, the service will be good. If you are patient, polite, prompt and skillful, you can give very good service with second-rate equipment, but if you are petulant, rude, dilatory and careless, the service will be poor, even if we have the best equipment in the world. A good woodsman can build a safe and comfortable house in a few hours, with no tool but his ax.

I am not talking to the operators alone, but to every man and woman, boy and girl in the company. Politeness, promptness, patience and skill are just as necessary for the office boy, the collectors and the lineman as they are for the operator. There is no excuse for impatience in any official, high or low, who tries to serve the public. If there were excuse for any, it would be for the operator, but those who are most tried must be most on their guard.

Now, I want all of you to feel that each of you have a real interest in the success of this company. I want every one of you to smile when you hear the company praised for the character of its services and to take to yourselves a part of the credit for making the service good. Remember, if we have careless employees, it will reduce our profits. If we have any employees who shirk their full duty, it will reduce our profits. If calls are not answered promptly our subscribers will leave us and there will be no profits. If our solicitors are not active, we cannot increase our business. If our collectors are negligent, or show want of tact, we will not get paid even for the service we have rendered. We are bound close together, whether we like it or not, and the failure of one to do his full duty renders worthless the honest labor of others. Whether we make good profits, or none at all, will depend upon the way your work is done; therefore, I feel that if you honestly help us to earn money, you should honestly share in the money earned, just as you have shared in the labor. Now, this is what I propose.

Beginning on July 1, after paying all expenses, taxes and the interest on our bonds, we will set aside one-fifth of the surplus remaining, and, during January next, we will distribute this amongst all of you who are in the employ of the company on December 31, 1903, in proportion to the salary of each. Any one who leaves our employ before December 31 will have no share in this fund. Any one going on a strike shall forfeit his share. Any one who comes with us at a later date will only receive his fair proportion. In other words, the distribution will be based upon the total amount of salary paid between July 1, 1903, and January 1, 1904. Now, what can you do for yourselves and for us on such a basis? If you do not earn a surplus for the company of $5,000 a month during the rest of this year I will be both disappointed and surprised. If the surplus averages $5,000 a month it would make a total of $30,000 for the half year. One-fifth of this would be $6,000. In June, 1903, we paid out a total of $11,739.52 in salaries. Distributing such a sum on such a basis would give every one of you an interest in the profits equal to more than half a month's salary. Is this worth striving for? Are you willing to do the best there is in you to get six and a half months' pay for six months' work? Don't you think, if you try, you could even earn seven months' pay for six months' work? I think so. If I did not I would not make this offer to you.

Remember, the easiest way to make money is not to spend it. Do you realize that all of you are spending money for us? If you injure any part of our apparatus, you have spent the money it costs to repair it. If you cut wire to waste, you have spent the difference in value between good copper wire and junk. If you use a good sheet of paper to figure on, when the back of an old envelope would serve as well, you have added to the cost of operating this plant.

Understand clearly, this is an experiment, and its success or failure depends wholly upon you. If you are not able to increase our surplus by more than the sum we pay you, the experiment will be a failure, and will not, of course, be repeated.

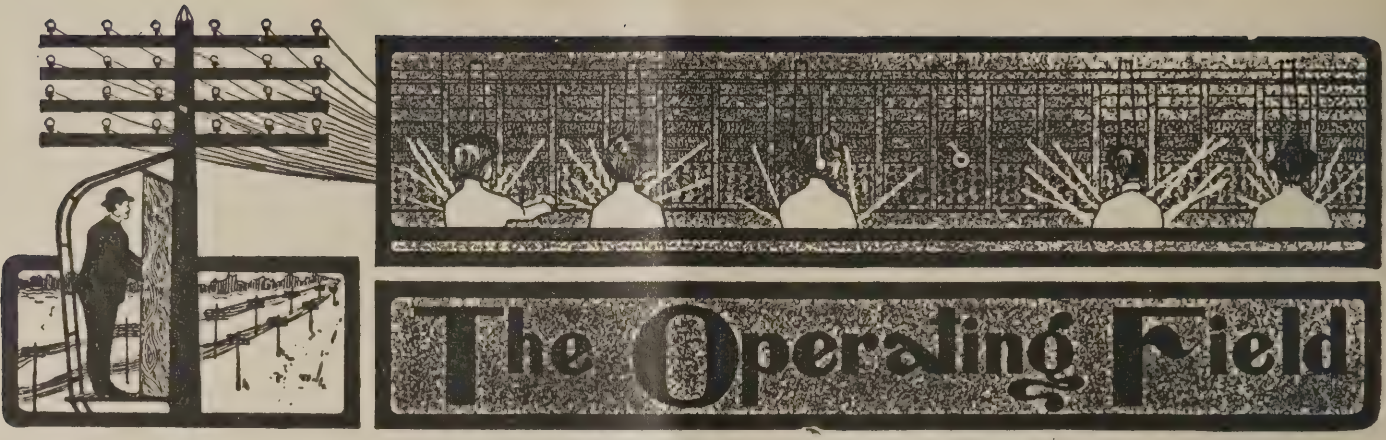
Let us make it a success. We can do it by doing the best we can and saving all we can.

Frederick S. Dickson, President.

CABLE ACROSS THE BRITISH CHANNEL

THE new cross channel telephone circuit between Brussels and London has so far proved successful. The exact length of the finished line connecting La Panne, Belgium, with St. Margaret's Bay, England, is 87 kilometers, or, roughly, 54 miles, and the total cost of laying same has been 750,000 francs, or $144,750. In a short time the following Belgian cities and towns will be included in the service: Antwerp and Charleroi will be connected with twelve English cities; Brussels with sixteen; Ghent, Malines and Termonde with eleven; Liege, Verviers, Bruges and Ostend will only have communication through Brussels. Localities in the United Kingdom shortly to be included in the system are Birmingham, Brighton, Bristol, Cambridge, Cardiff, Derby, Ipswich, Sheffield, Southampton, Leicester, Lowestoft, Newport, Norwich, Nottingham and Yarmouth.

Owing to the fact that this is one of the largest telephonic systems existing, the laying of the line was attended by many difficulties. The cable is of British make, made of four wires, comprising two distinct circuits. The diameter of the cable is 5½ inches. The wires are each insulated with a chemical composition and gutta percha, and are wound on a cable made of tarred flax. The whole is covered by two layers of special cotton separated by a copper band. On top of this again a layer of flax acts as a protector, and finally the whole is enclosed in galvanized iron wires prepared in a special way and incased in two layers of flax tightly wound in opposite directions. The tariff is fixed at 8 francs—about $2—for three minutes' conversation.



FINE SHOWING OF GRAND RAPIDS COMPANY.

At the annual meeting of the stockholders of the Citizens' Telephone Company of Grand Rapids, Mich., held recently, a change in the by-laws was made, so that for the first time the officers were elected by the board of directors. The directorate is made up as follows: C. F. Rood, Edward Fitzgerald, W. J. Stuart, L. J. Rindge, E. G. Studley, Philip Graham, R. D. Graham, C. E. Perkins, G. W. Perkins, E. B. Fisher and J. B. Ware, of Buffalo. The old officers were re-elected by the directors as follows: President, C. F. Rood; vice-president, Edward Fitzgerald; treasurer, W. J. Stuart, secretary, E. B. Fisher; general manager, C. E. Tarte; superintendent of construction, Albert Stacey. About fifty stockholders, representing $1,185,200 in stock, were present at the meeting.

The company now has 107 toll stations, as against 96 last year. The year ending July 1, 1903, shows an increase of over 30 per cent. in the Grand Rapids toll business, or a total of 288,572 connections. The gross income during the year closed was $274,343.79, an increase of $76,232.81; the gross expenses of the past year for operation, management, general expenses, taxes, etc., were $76,066.60; for reconstruction, repairs, maintenance and depreciation, $100,499.46; after paying dividend requirements of 2 per cent. each quarter, aggregating $82,777.73 in the year, the sum of $15,000 was carried over to surplus, making the new surplus account $55,231.48.

During the past fiscal year 340 new subscribers have been added to the list, making a total of over 1,100. The record also shows that the company has had 28 per cent. less trouble per subscriber than the previous year. The long-distance business has increased nearly 50 per cent. The gross receipts from this source during the past year were $65,696.54, as compared with $44,567.17 last year.

The net gain in the number of telephones installed is 3,586, or somewhat more than 34 per cent. A year ago the gain was 3,533. The gain in the city system is 642 instruments. The company has 5,165 telephones in this city, as against 4,423 a year ago. The number of telephones in service at the close of the fiscal year was 14,082, as against 10,496 a year ago.

The growth in the company's long-distance system in toll lines has been nearly twice as great during the year just closed as during the previous year. There have been added 160 miles of pole lines, carrying 210 miles of copper metallic circuits, and 71 miles of iron metallic circuits, making a total toll line system of 1,020 miles of toll line poles; 1,230 miles of copper metallic circuits and 934 miles of iron metallic circuits, having a total of 4,308 miles of wire. Copper for an additional circuit between Grand Rapids and Reed City, a distance of about 80 miles, and for a new line from Marshall to Battle Creek, about 50 miles, or a total of 260 miles of wire, has been ordered.

THE CENTRAL UNION LOSING GROUND IN INDIANA.

By R. D. Fisher, *Special Correspondent.*

The Central Union Telephone Company has filed its annual report with the Auditor of State. In comparing the report with the annual report for 1902 it is evident the company is losing ground. The report shows that on April 1 the company had 40,224 business telephones in service, against 46,336 for 1902, a loss of 6,112. The net earnings of the company were $173,706.63, against $224,526 for the previous year. The company has 4,159½ miles of line, and 55,808 miles of wire in the State. The extensions made during the past year were principally on toll lines. The company's franchises are expiring in a number of places and the business has been cut down to a non-paying basis at such places that renewals of franchises are not being asked. The company owns real estate in Indianapolis assessed at $52,000. The capital stock of the company is given at $3,587,100, and the bonded indebtedness at $6,000,000. The number of shares is 35,871, par value $100, and the market value $30. The company has experienced much difficulty with its employees and numerous strikes have occurred. The difficulty of procuring sufficient non-union men to kep up repairs has occasioned universal complaint because of the impaired condition of the system and poor service occasioning loss of business wherever service could be had from competing companies. The recent organization of the State Federation of International Brotherhood of Electrical Workers is claimed to be the outgrowth of the arbitrary spirit of the Bell Company's managers. This organization publicly announces its purpose of raising a defence fund with which to fight the Bell company. In consequence of this movement the four months' strike of the company's employes at Anderson, Muncie, Alexandria and other points in the gas belt was formerly declared at an end on the 11th inst. The Central Union practically agreed to all the demands of the electrical workers, and all men to be hired in the future are to be union men. The absolute necessity of making immediate repairs and improvements is said to have prompted the Central Union to make overtures and settlement, but the declared purposes of the new federation is thought to have been the real cause of the settlement.

NEW ORDINANCE FOR DES MOINES MUTUAL.

The city council of Des Moines, Iowa, recently repealed the Mutual Telephone ordinances and passed a new ordinance regulating the rates of the company. The Mutual company filed its acceptance, thereby entering into a contract with the city. The mayor affixed his signature and $2,000, the company's debt to the city, will be paid at once.

The new ordinance as granted is a great advantage to the Mutual company, as it relieves it from the old ordinance and restricts it only in the matter of rates. Until the number of subscribers exceeds 2,500 the rates will be $33 and $45 for residence and business telephones within the two-mile limit and an additional $3 for each additional mile. Each 500 subscribers added to the exchange will increase the rates $3 per year until the exchange has 5,000 subscribers, when the council will further regulate the rates.

A PROSPEROUS PENNSYLVANIA TELEPHONE COMPANY.

The Warren Telephone and Telegraph Company, of Warren, Pennsylvania, has just declared another quarterly dividend of one and one-half per cent. This exchange was formerly a part of the Union Telephone Company's system, and passed into the hands of the preesnt company September 1, 1902. The officers of the company are: Geo. H. Barlow, of the Citizens' National Bank, Corry, Pa., president; Eli Barlow, vice-president, and John

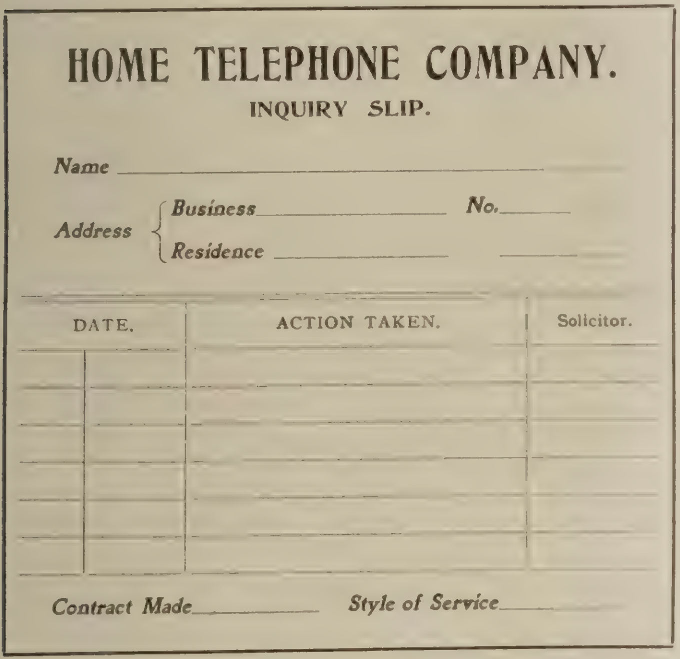
H. Wright, secretary, treasurer and general manager. At present there are 423 local subscribers connected, and new ones are being added at the rate of fifteen a month. The rates charged are $36 for an individual business line, $28 for a two party business line, and $22 for an unlimited party line. Resident rates are $24 for an individual line; $20 for two party, and $16 for three party lines. The long distance lines of the Union Telephone Company, of Erie, Pa., and the Interocean Telephone Company, of Buffalo, N. Y., connect the exchange with several hundred cities and villages in Pennsylvania, Ohio and New York. The Warren Telephone Company is capitalized at $50,000, and has no bonded or floating indebtedness, and has been paying quarterly dividends since it passed into the hands of the present management.

SOLICITING TELEPHONE SUBSCRIBERS.

By Wm. H. Hyde.

THE question of soliciting subscribers has been evolved into fine art by telephone companies, and an accepted form of campaign is now laid out by them for their solicitors to follow. Each company follows lines of its own that it thinks best adapted for securing the business.

An excellent plan for soliciting new subscribers that, if carried out is bound to bring results, is given herewith. Lay out the town or city into districts, select a solicitor for each district, and have him make a house to house canvass. If the party visited already has a telephone see if he has a telephone in his residence, if he is called upon at his place of business. If not, the solicitor should endeavor to get an order to place a telephone in the residence, and vice-versa. The solicitor should be furnished with a supply of "Inquiry Slips" (see Fig. 1 for an outline of a form to be used for this purpose), so that he may fill in a slip for each person or firm visited during the day, showing action taken, etc., to be turned in to the contract agent or chief solicitor each evening. If the solicitor succeeds in getting a contract the matter is closed. If not, the slips should be filed away according to districts and streets. Contracts should be taken in duplicate, so that the duplicate can be accepted and mailed to the subscriber as a safeguard against solicitors handing in "dummy contracts."



HOME TELEPHONE COMPANY.

INQUIRY SLIP.

Name ____

Address *Business* ____ *No.* ____
Residence ____ ____

DATE.		ACTION TAKEN.	Solicitor.

Contract Made ____ *Style of Service* ____

After the town or city has been thoroughly canvassed the solicitors should be changed about, each solicitor taking some other district, and canvassing the district from the inquiry slips on file. In a great many cases where one solicitor fails, another will secure the contract. This plan of changing about should be followed out as long as new business can be secured. Finally when a town or city seems to be completely worked out, file away the slips for future reference, either for the local manager's use or for a return trip. This done go to the next town and work on the same plan. It will be found that the results from canvassing an entire town or city will be much more satisfactory than those secured from only choosing people who should have telephones.

MORE TROUBLE FOR THE NEBRASKA TELEPHONE COMPANY.

THE decision of the Supreme Court of Nebraska in the case of the Nebraska Telephone Company vs. Western Independent Telephone Company, which held that the telephone company was occupying the streets of Louisville, Neb., without franchise or lawful right, has been made the basis of a suit by the municipal corporation of Fremont, Neb., against the same company. It is alleged that the situation at Fremont is the same as at Louisville, and the city wishes to take advantage of it.

BERGHOLTZ TELEPHONE COMPANY WILL INSTALL EXCHANGE.

THE Bergholtz Telephone Company, of Wellsville, Ohio, will in the near future install an exchange in Carrollton. The exchange is to be arranged for 100 telephones. Poles have been purchased and the work of placing them will be commenced immediately, says *Money*. The company is now operating with considerable success several exchanges. The Scroggsfield exchange has 49 subscribers; Bergholtz, 40; Amsterdam, 14; Harlem Springs, 40; Norristown, 22, besides free connection with 74 telephones in Salineville. It has toll stations in East Springfield, Pravo, Pine Hill, Circle Green, Mechanicstown and Wattsville. The officers of the company are: L. W. Steinmetz, president; R. G. McLaughlin, general manager; A. G. McBane, secretary and treasurer, who, with W. E. Steinmetz, J. W. and S. G. Carson, Ernest Favri, W. G. Donaldson and James McBane, compose the board of directors.

LARGE GAINS OF TENNESSEE COMPANY.

THE Bristol Telephone Company, of Bristol, Tenn., commenced operations in 1894 and has been for nine years a successful enterprise. At the present time connections are furnished over a distance of two hundred and fifty miles, from Lynchburg, Va., to Limestone, Tenn., and further extensions are being made.

The company now has over seven hundred telephones in Bristol and has many other orders which are being filled as rapidly as possible. The past six months shows a gain of over forty per cent. in the business of the company.

INDIANA CAPITALISTS IN OHIO.

GEORGE W. BEERS, of Ft. Wayne, Ind., and H. B. Gates, of Indianapolis, Ind., were recently in Cincinnati, Ohio, in the interest of Independent telephone companies of Ohio and Indiana. The object of their visit was to investigate local telephone conditions. If their report proves favorable, it will lead to the organization of a new telephone company financed by local capitalists and wealthy business men of Ft. Wayne and Indianapolis. In the three States adjoining there are hundreds of business men who desire reliable telephone service at more reasonable rates than are in vogue at present. With better facilities in this line a vast volume of new business can be opened up.

BABY TENDED BY TELEPHONE.

A RICHMOND (Ky.) lady is entitled to the palm for inventive genius along the telephonic line. It is recorded that she, wishing to visit a neighbor the other day pulled the baby's crib up in front of the telephone took down the receiver and calmly told the operator that she was going out to a neighbor's and if the baby waked up and began to cry to ring her up at the neighbor's. She ought to get a patent on that baby tender.

FEDERAL'S NEW STOCK CERTIFICATE.

THE Federal Telephone Company has issued new stock certificates in which the par value of the stock is reduced from $100 to $10. Those who desire to have their present certificates transferred and receive the new certificates may do so. It is not necessary for stockholders to secure the new certificates unless they so desire, but at the same time it is desirable for various reasons.

DECORATIVE TELEPHONE POLES.

THE following exchange explains an unfortunate state of affairs in Illinois: "Just west of Kenney some farmers used willow poles for telephone posts and now the poles are covered with new branches and green leaves."

The Editor's Page

A NEW APPLICATION OF THE AUTOMOBILE.

THAT an automobile owned by the president of a telephone company can be put to uses other than those pleasurable is evidenced by the report which comes from Webster City, Iowa, where the manager of the Independent telephone company used his automobile in one instance to assist the men in drawing in cable and in another to supply energy to the exchange while the regular batteries were under repair. The story goes that while Mr. Martin, owner of the machine, was making the rounds of his telephone construction crews, the idea impressed him that the method now in use of pulling in underground cable with a windlass was one exceedingly slow and inefficient. After watching the men at work for a short time he called to the foreman of the crew to fasten the draw wire which was attached to the cable being pulled in, to the rear of his automobile. This was done and the machine moved steadily down the street, taking the draw wire and cable with it as evenly and smoothly as could have been done with the windlass. The ammeter in the front of the machine showed by its readings how much power was being taken to pull in the cable, and when the amount became excessive, which indicated an obstruction in the conduit, the machine was stopped. After any such obstruction had been removed the work was continued. In half an hour Mr. Martin with his automobile had done as much work as three men could do in a day. Mr. Martin says he does not intend to keep this sort of work up, but simply has demonstrated that there are many applications for the automobile. Some time ago it was necessary to repair the batteries at the telephone exchange and while the repairs were being made the batteries in the automobile furnished the power required to continue service. The machine was run up to the exchange and leads were taken up from its battery and attached to the proper points in the terminal room of the exchange and the service went uninterruptedly on.

It is hoped that a few instances like this, where the pleasure automobile has been put to a practical purpose will do something toward softening the feelings of pessimists who have in the past believed that the automobile could be used for no good purpose and its only applications were the running down of pedestrians and an object on which to squander money.

TRIALS OF THE POLLAK-VIRAG TELEGRAPH IN GERMANY.

A HIGHLY interesting application of the telephone to the sister art of telegraphy is found in the new Pollak-Virag writing telegraph, now being tried in Germany. The receiver of this system is a telephone, to the diaphragm of which is attached a tiny mirror; by means of a reflected beam of light the movements of the diaphragm mark the signals on the sensitized paper, which is afterwards developed and fixed. The extreme sensitiveness of the telephone is thus utilized in a very beautiful manner. The actual apparatus consists of two receivers with two mirrors, one serving to produce the vertical components of the writing, and the other the horizontal. The signals to produce the writing are sent into the circuit by means of a perforated tape, as in other automatic telegraph systems. The system is capable of extraordinary speeds, 40,000 to 50,000 words an hour being claimed. The received messages come out in vertical "handwriting," not over-beautiful, but still legible with a little good will on the part of the reader. Trials are going on in Germany.

TELEPHONE BARRIERS IN GREAT BRITAIN

A CURIOUS action has arisen between the National Telephone Company and the corporation of Hull, and nothing could more strikingly illustrate the difference in telephone conditions in the United States and in Great Britain than a brief outline of this case. Whereas in the United States the municipalities have often had to coerce telephone companies into putting their wires underground; in Great Britain the telephone company has had to coax the municipalities into granting it permission to put its wires under ground. The British municipalities hold a dog-in-the-manger attitude toward their streets, and strongly object to anyone, but themselves, doing any work in them. Consequently permission to put down telephone conduits was given only after prolonged negotiations and subject to many restrictions. One clause in the agreements providing for such work generally present, was to the effect that the telephone company should remove all its wires and conduits from the streets whenever called upon to do so by the municipality, six months' notice being necessary. That such an extravagant condition as this should be imposed, gives some idea of the difficulties telephony has to contend with in Great Britain. Under ordinary conditions such a proviso would clearly be inoperative for the reason that the wires and conduits could not be removed without stopping the telephone service. But in 1899 it was made lawful for municipalities to establish telephone systems themselves under license from the Postmaster General. The Act of 1899, however, protected the telephone company and aimed to prevent the establishment of municipal telephone monopolies by providing that the license of the National Telephone Company should be extended to correspond with the term of any municipal telephone license granted in respect of a town where the National Company had an established system at the date of the granting of the municipal license. The Corporation of Hull applied for a telephone license and obtained it, and gave the National Telephone Company notice to remove its wires from under the streets of the city of Hull, thereby intending to defeat the purpose of the Act of 1899 by driving out competition and establishing a municipal telephone monopoly. The National Company claims that under the act it is entitled to a telephone license in Hull for the period of the municipal license and that all contracts in existence at the time of the passing of the act should continue during the period of that license. The defense of the corporation was that the legislature did not intend that whatever agreements were in existence at the date of the Act of Parliament should be continued during the period of a new license to be granted. The judge said that the question raised was one of considerable importance and reserved his decision.

INDEPENDENTS INVADE THE CHURCHES.

WHILE fully aware that Independent telephone men were essentially full of zest and push, we never before heard of a company that placed its telephone stations in churches. The Tri-State Telephone Company, of Uniontown, Pa., has, however, encroached upon this field, and appears to be increasing its popularity by the encroachment. This company is making arrangements whereby a telephone will be installed in each of the churches of the town. The originator of the idea says: "There have been quite a number of times when heavy rains came up at the time church was out and people were obliged to wait. After our telephones are put in umbrellas or conveyances may be ordered in such cases and a long wait avoided."

FOREIGN CURRENTS

By "The Arrester."

A QUESTION was recently directed in the House of Commons to the Postmaster General, asking him if he could see his way to increase the time limit for long distance calls on the telephone system of the Post Office from three to five minutes. The Postmaster General's reply was as follows: "Owing to the time required to obtain the connection of subscribers' exchange lines with the trunk lines, not more than about twelve conversations an hour are possible under the best conditions on any trunk line with the three minutes' limit. An increase in this limit would make the lines available for fewer subscribers and would involve a proportionate increase in the charges for their use. As about 95 per cent. of the present trunk line conversations are completed within three minutes, and as the traffic is practically confined to business hours, a general extension such as is suggested, would clearly not be to the advantage of the public. An extension of the limit between 8 p. m. and 6 a. m. from three to six minutes was made in March last, to encourage the use of the trunk lines at hours when hitherto they have been little used." On general principles the Postmaster General is quite right; three minutes is a more practical period for telephone conversations than five. Further, to ask for an extension of time without an increase of rate—which apparently was the purport of the question—is a trifle unpractical. But it is evident that the British long distance lines are not very economically worked. Even allowing a full three minutes for each conversation the figure given above shows that the lines are used for paying work only for sixty per cent. of each hour, a very wasteful result. The extension of the time limit from three to six minutes after 8 p. m., strikes one as being rather a half-hearted style of night rate, especially as it is stated that normally 95 per cent. of the conversations are within the three minutes' limit.

Un-Used Facilities

THE *Electrician* contains the following interesting note on telephonic facilities in Great Britain: "It is surprising how ignorant the general public is as to the facilities placed at the disposal of telephone subscribers. A recent consular report states that Danish telephone subscribers can telephone their telegrams to the post office at a small supplementary charge. Some of the English papers, referring to the report, deplore that the same facility is not afforded to the British subscriber. As a matter of fact, this facility was conceded to telephone subscribers in this country in 1892, and every subscriber, whether on the Post Office or National system, may telephone his telegrams to the post office, no charge being made beyond the ordinary fees. Not only this; he may also dictate letters thirty words in length to a post office for transmission by express messenger at 6 cents a mile; he may dictate letters sixty words in length, for postage as ordinary letters; he may have telegrams telephoned to him immediately on their receipt at the post office, and he can call express messengers from the post office. The deposit made by the subscriber on account of trunk charges may serve also as deposit for the fees charged for these facilities. The public is not entirely to blame for its ignorance, however, for the officials at many of the district post offices are entirely unaware of the services they may be called upon to give. On paper, therefore, we are ahead and not behind other countries in these respects. In point of fact, however, we are behind, for the public makes such little use of the telephone for these purposes that the number of post offices provided for these services is still limited.

Why It Is Thus

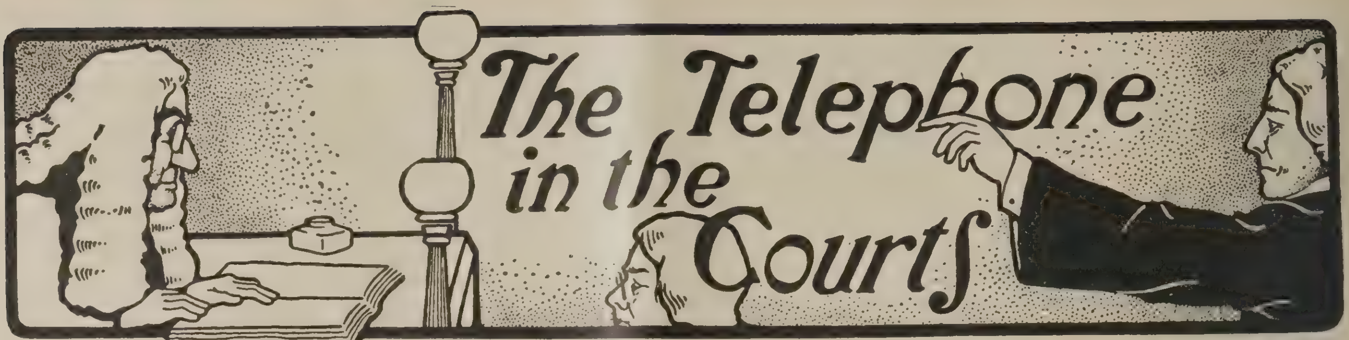
THE real test of the advantage of these facilities is whether they are freely availed of by the public or not, and the *Electrician* hardly tells the full story when it says that the public is ignorant of the facilities described and makes little uses of them. The reasons for the ignorance and apathy on the part of the public are probably that the services are insufficiently advertised and poorly performed. There is no denying the usefulness of such telephonic facilities as those described. In fact THE AMERICAN TELEPHONE JOURNAL has at various times pointed out that in these directions lie the by-products of the telephone service, by utilizing which the service could be made more valuable to the public and more profitable to the suppliers. But the public must be very thoroughly instructed as to the availability and usefulness of the extra services, and the public does not learn such lessons readily. They must be dinned in by constant announcements. Another important point is that the service must be smartly executed. From what we have seen, heard and read, we doubt if in the case under discussion the efficiency of the service is such as to cause the public to use it freely for telephoning special messages, express or ordinary letters.

Decision Against Hull

THE action referred to in electrical journals of the National Telephone Company against the Corporation of Hull has been decided against the company. The case is full of legal technicalities, but practically the result is to uphold the Hull Corporation in its right to cancel the agreement under which it granted the National Company power to occupy the streets of Hull with underground conduits and cables. The Corporation of Hull gave notice under the agreement to terminate the privilege just before the Act of 1899, which rendered municipal telephony legal, came into force, and afterwards secured a telephone license. The court decided that the Corporation acted within its legal rights. Since March, 1900, the Corporation has allowed the company's wires to remain on sufferance, and doubtless will be willing to continue that situation until the proposed municipal system is ready to take up the service. Whether the company will accept such a situation is another question. The judge expressed his sympathy with the telephone company in the awkward situation created and hoped that an arrangement would be come to whereby the waste apparently threatened would be avoided. It was announced that in the event of an appeal being taken an agreement had been reached whereby the cables would be allowed to remain until the appeal had been decided.

The "Electrician's" Views

AFTER noting that the National Telephone Company has at Hull an excellent central battery system with underground wires, now at the mercy of the Corporation, the *Electrician* comments on the situation as follows: "If, eventually, the Hull Corporation gains the day, we cannot think they will be well advised if they adopt an uncompromising attitude towards the company. We believe the main question at issue is one of tariffs, or possibly merely the everlasting question of municipal trading versus company trading, and that there is no general feeling that the present telephone system at Hull is either inadequate or inefficient. Surely, it would have been more advantageous to all concerned if an agreement had been come to, instead of a mutually dstructive competition being set on foot, commencing with the waste of the present underground telephone network. The Corporation has already let tenders for its own underground telephone cables, and apparently there will either be a fight to the death, as at Tunbridge Wells, or, if both parties survive until 1911, when both licenses expire, the government will have to buy two incomplete telephone systems. With the Hull ratepayers and their representatives one can have but little sympathy, but the taxpayer, who will ultimately have to pay the piper, owing to the bungle of the Telephone Act of 1899, is to be pitied."



The Telephone in the Courts

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

CITY ENJOINED FROM TAKING STOCK IN TELEPHONE COMPANY.

SUIT against the city of Evansville, Ind., has been begun by Robert D. Richardson, a prominent Democratic politician and ex-circuit judge, to enjoin the city from taking stock in the proposed municipal telephone company of Evansville, or from exercising any rights as stockholder under the attempted subscription already made. The judge sues as a taxpayer desirous of establishing by judicial decree the limit of liability of the city in the matter. He bases his contentions on the theory that the city will be liable finally for all indebtedness of the company if it should fail. The contentions of the bill of complaint may be thus summarized:

First. The city has no power to subscribe for a majority of the stock of the telephone company. While it may under the charter purchase or hold stock, there is a difference between purchasing and holding stock in an organized corporation and subscribing and becoming the chief organizer of an experimental scheme like the one proposed, in view of the strict construction to which municipal corporations are subject in the interpretation of their powers.

Second. The granting of the franchise, which is the sole consideration for the transfer to the city of 7,900 shares of common stock, does not operate as payment therefor unless the fact has been passed upon in good faith by a disinterested board of directors, whose discretion cannot be reviewed. The franchise is not in any contingency worth exceeding $50,000, and the subscription of $197,000 by the city would operate to leave an unpaid indebtedness, which is void under the provision of the constitution limiting indebtedness in any form to an amount equal to 2 per cent. of its taxables, because the city has long since passed that point.

Third. The secondary liability for the city for a sum equal to an amount of stock subscribed, in case of insolvency and exhaustion of the assets of the corporation, would involve a contingent liability of $197,000; that is, this is such an indebtedness as is provided against by the constitutional provision referred to.

Fourth. The charter only grants the right to the city to purchase and hold a majority of the stock of the corporation. The true spirit of this provision would not permit the city, in the original scheme of subscription and incorporation, to stipulate permanently away to preferred stockholders the absolute selection of three out of seven directors.

It is further charged that the scheme was conceived, and is being used, by city officials for purposes of personal ambition.

A THESIS ON TELEPHONE LAW.

TORE TEIGEN, of Sioux Falls, South Dakota, a graduate of the Wisconsin College of Law, took as the subject of his baccalaureate thesis the following question, which is of interest to all telephone companies: "Is the construction of telephone and telegraph lines an additional servitude on the public streets?" His paper is carefully reasoned and well written.

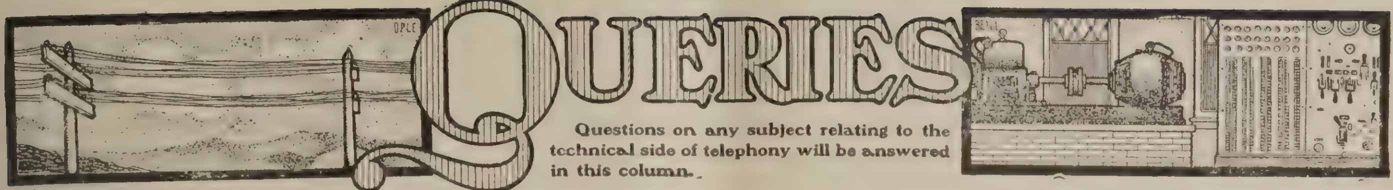
His argument is as follows: The telephone and telegraph companies contend that what a street was used for fifty years ago is not a test of the proper use to-day. The primary object of a street is travel, yet, in fulfilling that object, it may serve incidentally other purposes, such as the sewerage system serves in aiding to protect the health of the community. It might be justified on the ground that it is a new use that should not be hampered by complicated condemnation proceedings or the difficulties of properly assessing damages to the adjoining owners of property. As a means of communication it is unexcelled, and it facilitates traffic to such a degree as to be indispensable. The street is the result of mutual concessions by all the owners of the community, in order to have channels for travel and communication. As long as it is used for travel and communication, there is no additional servitude upon the abutting owners, and they have no right to further compensation. The writer then treats a number of leading cases by different supreme courts and comes to the conclusion that the majority of them hold that the placing of telephone and telegraph poles is an additional servitude upon the adjoining property. Yet, he proceeds, while in strict and technical meaning this holding may be correct, the expediency, practicability and justice of the opposite rule would be more than enough to outweigh the argument in favor of such a holding. Strictly speaking they are not a means of travel, but as a means of communication they are such an aid to commerce and travel as to be within the meaning of the term "travel" in a broader sense. They at the same time decrease the amount of traffic on the street. The objection that the poles and wires might be placed so thickly as to become not only a great nuisance but a positive danger can well be obviated under the police powers of the state. He concludes therefore that the preponderance of decided cases in favor of the prevailing doctrine that telephone lines are an additional servitude is not so great, but that it may be said to be fairly doubtful which will finally become the more generally accepted rule.

SALE OF BONDS ENJOINED.

THE National Bank of Augusta, Ga., has been temporarily enjoined from selling certain bonds of the Augusta Telephone & Electric Company that it is holding as collateral security for a loan. The Telephone Company is in the hands of a receiver and the bank intervened in the proceedings to protect its interests. The complairant in the suit, Paul H. Langdon, thereupon amended his petition and asked for an injunction. The petition alleges that the bank holds $24,300 of the bonds of the company as security for a loan of $13,200. As the amount of the bonds held is greatly in excess of the amount due the bank, the petitioner declares that the sale of the bonds by the bank, as its property, would be an injustice to the other creditors of the corporation, of whom the petitioner is one, as the company would be responsible for the face value of the bonds in the hands of an innocent purchaser. The petition further alleges that the bank officials have expressed an intention of selling the bonds. The injunction was granted as asked for with the provision that the bank could come into the court at any time and ask for a modification of the order.

LITIGATION BECAUSE OF A CONSOLIDATION.

AN important telephone case pending before the Supreme Court of New York is that of Lucius M. Canfield v. William H. Cloher, Jr., for the recovery of $16,000. It arises from the consolidation of several Independent companies into the New York State Telephone Company, Cloher assuming the liabilities of the Central New York Telephone Company by the consolidation, and Canfield being a creditor of the company. The case will be tried next term.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

Conducted By WILLIAM W. DEAN

CENTRAL BATTERY TELEPHONE SYSTEM.—(156.)

We have a system of eight telephones, each of which is wired as in Fig. 156a. They are all connected in parallel to the same pair of wires. Of these telephones, seven are on desks in one room and the eighth is in another part of the building. We are using two electric bells and 8 push buttons for signalling. There is one electric bell in the room where the seven telephones are and the manager at the eighth telephone can, by means of a push button, make it give seven different signals, according to a code, and can thus get the right man to talk to. There is a push button at each of the seven telephones by means of which each man can call the manager. These electric bells and push buttons are on a separate circuit and have nothing to do with the telephone circuit.

There are now at each telephone two dry batteries, which give us considerable trouble. I want to operate the system with a common battery, using the arrangement shown in Fig. 156b, which will do away with the batteries at the telephones. I read about this scheme in an electrical paper of recent date. I figure on using the two spools from a 1,000-ohm bell for the impedance coils at *c*, *c* and about five dry batteries at *B*. Do you think that the telephones will operate successfully with the coils and batteries that I have decided on? What changes must I make in the connections in the telephones so that they will operate on this system? B. E. C.

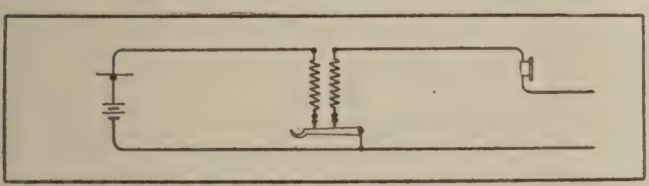


Fig. 156a.

The circuits shown in Fig. 156*c* will meet your requirements. Coil *C* should measure about 20 ohms on each winding and five cells of the Fuller or similar type would be better than dry cells. The induction coil at the telephone stations can be dispensed with and the transmitter and receiver connected in series as shown.

TEST FOR IMPURITIES IN WATER FOR STORAGE BATTERY.—(157.)

Through your Query column please give me a test for impurities such as iron, etc., in water for storage battery purposes. J. R. H.

The Franklin H. Kalbfleisch Co., of New York, give us the following information: By all means use distilled water, if possible, as slight impurities in the water are bound to eventually give trouble. The test for ferric iron in water is: Add a few drops of chemically pure hydrochloric acid to the water, then add a few drops of a solution of sulpho cyanide of potassium. If iron be present the water will be given a coloration from a pink to a red, the depth of color depending on the quantity of iron present. Be sure that the hydrochloric acid used is free from iron. This may be tested for by adding a few drops of the sulpho cyanide of potassium solution to a portion of the acid, diluted with pure distilled water. The presence of iron will be shown by a pink to a red coloration of the acid. The development of a blue color on the addition of a few drops of a solution of potassium ferricyanide to the original solution would indicate the presence of iron in the lower or "ferrous" form.

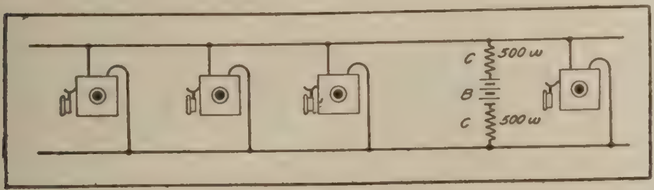


Fig. 156b.

If on the addition of a few drops of silver nitrate to the original solution a cloudiness develops the presence of chlorine is indicated. Iron is the most common element that is apt to give trouble. The tests for the other impurities are too delicate and exacting to be performed outside of a properly equipped chemical laboratory.

THE LIFE OF POLES.—(158.)

What is the life of a tamarack pole? Is it as good as chestnut? M. W. J.

The life of a chestnut pole depends upon the location, and also upon the weather conditions. Experience shows that the average life of a good chestnut pole is about fifteen years. Tamarack is not used nearly as extensively as chestnut, and therefore the data giving its life is not quite as accurate as that for chestnut. What data is at hand shows the life of a tamarack pole to be about ten years. Of the two, chestnut is the better to use on account of its greater lightness and durability. It must be remembered, however, that the selection of wood for poles depends largely upon local conditions, and no hard and fast rules can be laid down on this subject.

RECHARGING DRY BATTERIES.—(159.)

Can dry batteries be recharged after they have become exhausted? C. O. H.

Dry batteries can be recharged, but it does not pay to do it, as new ones can be bought for less money than the cost of charging.

CARBON FOR TELEPHONE TRANSMITTERS.—(160.)

We understand that the granular carbon used in the American Bell solid back transmitter is of a peculiar grade, and it is this that gives the transmitter its superior qualities. Is there any truth in this? If there is, what is the difference between this granular carbon and ordinary granular carbon? O. B. C.

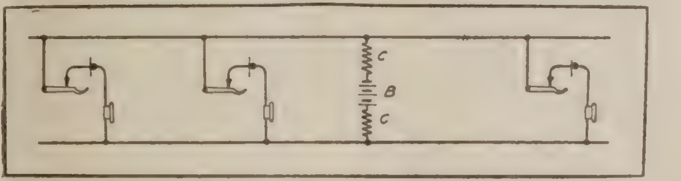


Fig. 156c.

The granular carbon used by the American Telephone and Telegraph Company in their solid back transmitter is very dense and is capable of taking a very high polish.

SOLDER WITH A LOW FUSING POINT.—(161.)

Can you give me the composition of the solder which melts at a low temperature which is used in heat coils? B. A. C.

A mixture of the following proportions will fuse at about 160° F.

1 part block tin.
1 part cadmium.
2 parts lead.
4 parts bismuth.

BIMETALLIC WIRE.—(162.)

Can you tell me why the so-called "bimetallic" wire which has a core of steel and an outer coating of copper has not come into general use?—G. O. C.

The copper covering cracks and moisture starts an electrolytic action between the iron and copper, and it also causes the iron core to rust.

LAMINATED GENERATOR ARMATURE.—(163.)

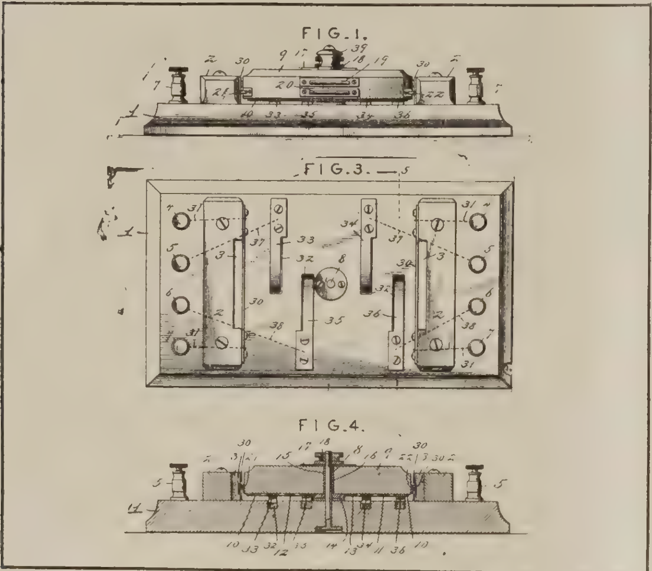
We have just bought a new telephone and the armature of the generator is made up of pieces of sheet iron, which are pressed together on the shaft. Is this a better way to make an armature or is it cheaper? F. H. B.

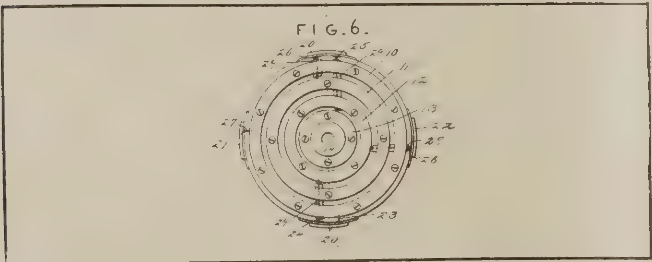
The type of generator you mention should be more efficient than one with a cast iron armature of the same dimensions, everything else being equal. The armature is made up of sheet iron so as to reduce the losses due to eddy currents.

PATENTS ISSUED

ROTARY EXTENSION BELL SWITCH.

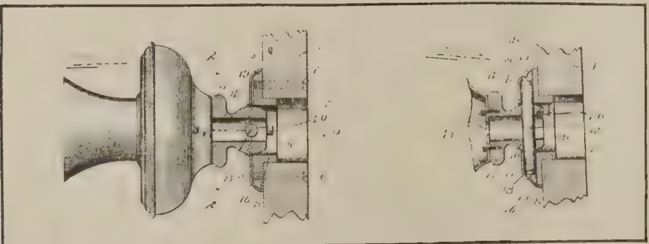
George E. Cock, of Packerton, Ind., patents (No. 734,402) a rotary extension bell switch. This invention is intended for use at points where two lines terminate and when one instrument and an extension bell are used. The operation of the switch serves to connect the instrument to either line as occasion requires and at the same time to connect the extension bell to the line not in use. It is also possible to connect the two lines together. Fig. 1 shows a side elevation of the switch, Fig. 3 a plan with the top disc removed, Fig. 4 a longitudinal section, and Fig. 6 a bottom plan view of the disc. The arrangement of contact springs will readily be seen from the figures, the various combinations being effected by the rotation of the disc *9*.





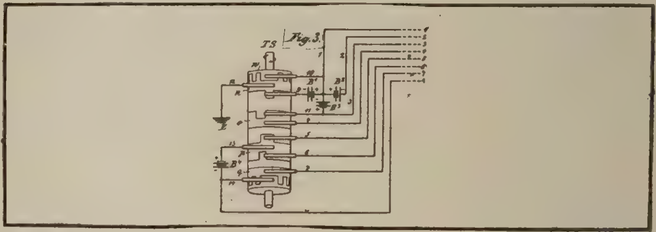
TRANSMITTER ARM.

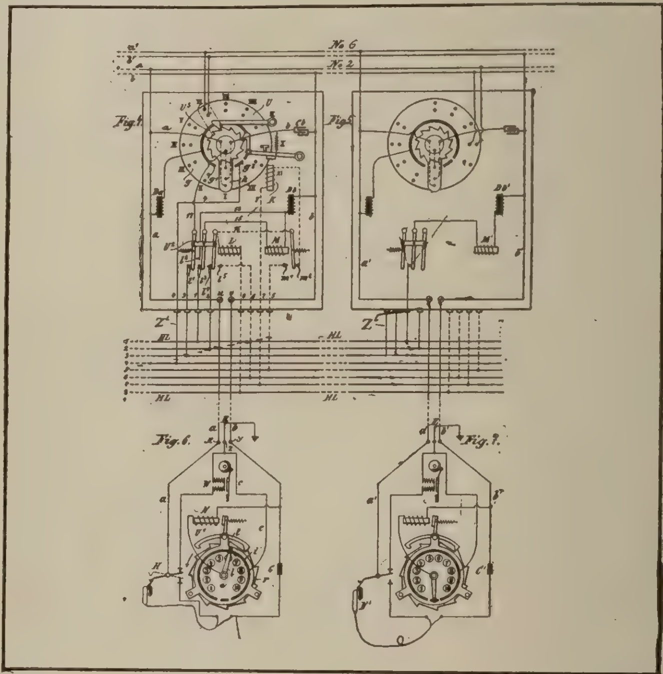
William Kaisling, of Chicago, Ill., patents (No. 733,070) a transmitter arm, and assigns his invention to the Stromberg-Carlson Telephone Manufacturing Company. The object of the invention is to provide a transmitter arm whereby the transmitter is capable of considerable vertical adjustment and at the same time does not extend out from the backboard. Fig. 1 shows a side elevation partly in section, and Fig. 2 a longitudinal section. The spherical end portion of the transmitter holder is pivoted on the pin *14*, the holder being hollow to contain the connecting wires. A plate *16* is placed over the mounting. The screws *19* serve to adjust the compression on the hinge pin. The transmitter is secured to the front board of the telephone as shown.



AUTOMATIC CONTROL STATION TELEPHONE SYSTEM.

Friedrich Merk, of Berlin, Germany, patents (No. 732,874) an automatic central station telephone system. The selective switch mechanism, located at the central office, is shown in Figs. 4 and 5. Figs. 6 and 7 show the mechanism and wiring at the substations. A line from each station is run through the switches at the other stations, the contact studs on the switches corresponding to a given station, being connected in parallel across the line. Connections are obtained, at the various stations, by means of the lever and dial, located at each station. Fig. 3 shows the selective commutator and batteries located at the central office, and this Figure, taken in connection with Figs. 4, 5, 6 and 7, shows the complete circuit and method of operation.

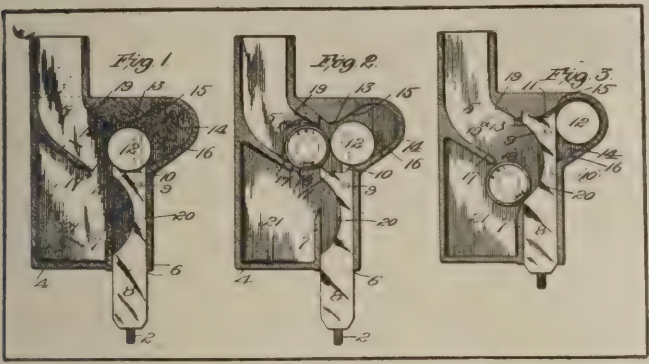




TELEPHONE-LOCK.

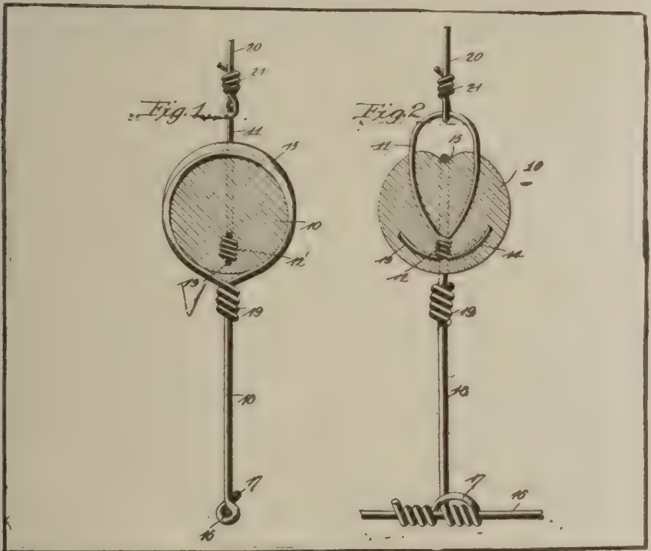
William H. Scott, of St. Louis, Mo., patents (No. 732,788) a telephone-lock, and assigns his patent to the Controller Company of America. Fig. 1 shows the invention in its normal position. Fig. 2 is a similar view after the insertion of a coin, and Fig. 3 shows the device after the locking mechanism has been released. This lock, which is adapted to operate in connection with coin collecting boxes, is contained in the box, as shown in the figures.

The coin box is fastened to the telephone and carries a slide bar *8* which engages with the hook switch *2*, of the telephone. The locking disk, *12*, prevents the slide bar from rising under the influence of the hook switch spring, and thus prevents signals being transmitted to the central office before the insertion of a coin in the slot, *5*. The action of the coin in removing the locking disk and allowing the slide bar and hook switch to rise is clearly shown in the figures. When the receiver is replaced upon the hook, the slide bar falls by its own weight and the locking disk again comes into locking position, which restores normal conditions.



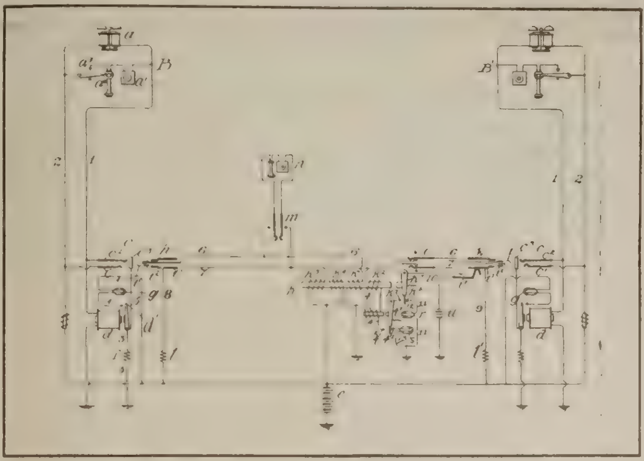
INSULATOR.

Charles Claydon, of Searcy, Texas, patents (No. 725,044) an insulator. The object of this invention is to provide an insulator for suspending electrical conductors and preventing the fall of the conductor in case the insulator breaks. Fig. 1 shows a cross section of the insulator and Fig. 2 a longitudinal section. The block *10* is made of any suitable insulating material, such as porcelain or glass and has an endless wire loop *11*, embedded in it during the process of manufacture, as shown in Fig. 2. Surrounding the insulator is a groove, *15*, which passes through the loop, as shown. The line wire, *16*, is connected to the insulator by the wire *18*; this wire passes around the groove on the insulator, as illustrated in Fig. 2. The insulator is connected to the line support by means of the loop, *11*, and wire *20*. It will be seen from the figures that should the insulator break, the loop formed by the wire, *18*, will engage with the loop *11*, and support the line wire.



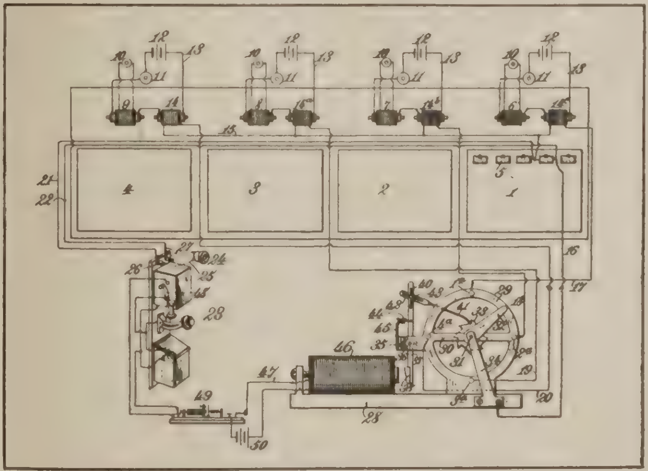
TELEPHONE SWITCHBOARD.

Charles E. Scribner, of Chicago, Ill., patents (No. 734,099) a telephone switchboard, and assigns his invention to the Western Electric Company, of Chicago. The circuit arrangement of this board is shown in the figure. The object of this invention is to provide a switchboard circuit in which each of the operator's supervisory signals shall have a definite function to perform, and so arranged that the lighting of either signal shall convey to the operator definite information as to the condition of the connection. Station *B* represents a calling station and station B^1 a called station. The line signals are operated by the removal of the receiver from the hook, and are extinguished by the insertion of a plug in the line jack. This forms a low resistance shunt around the lamp, as shown in the figure. The repeating coil is connected in the cord circuit in the usual way, and is bridged by the battery *e*. The coil is provided with an iron core *K* and an armature K^8. The calling plug is provided with a spring *V* in the plug socket, which spring is brought into contact with wire 10, when the plug is removed from its socket. The operation of the system is as follows: Connection having been made by the operator with the calling station *B* the case of the repeating coil is energized and K^8 brought into contact with K^7. The insertion of the calling plug in the jack closes the circuit from battery *u* and lights the lamp *s*. Station B^1 having answered, relay *t* is energized and lamp *S* extinguished. Relay *t* remains energized as long as either receiver is off the hook. When both subscribers hang up armature K^8 is released and a circuit closed through lamp *r*, which signals the operator to disconnect.



TELEPHONE EXCHANGE.

William W. Woodruff, of Winchester, Ky., patents (No. 734,386) a telephone exchange. The object of this invention is to provide a means whereby the manager or chief operator of an exchange is enabled to secretly supervise the operators. The general arrangement of the system is shown in the figure. Each operator's circuit is provided with an auxiliary induction coil, the primary of which is connected in series with the primary of the regular coil. One terminal of the secondary of each auxiliary coil is connected to a common wire, which is in turn connected to one side of a given line in the switchboard. The free terminals of the secondaries are connected to contact studs on the selective device shown in the figure. The free terminal of the switchboard line is connected to the contact arm of the selector. The supervising instrument may be located at any convenient point, and is connected to the switchboard line mentioned above. A detector receiver *24* is bridged across the line. By means of the switch located on the instrument the selective mechanism can be operated so as to connect the supervising instrument to any desired operator's position. The wiring and arrangement of the selector is clearly shown in the figure.



The Week's Messages.

FINANCIAL

LIBERTY, MO.—The Liberty Telephone Company has increased its capital stock from $15,000 to $25,000.

LACONIA, N. H.—The Citizens' Telephone Company of Laconia has notified the Secretary of State of an increase in its capital stock to $160,000.

ST. MARY'S, O.—The capital of the St. Mary's Telephone Company has been increased from $20,000 to $50,000 for the purpose of rebuilding the plant.

EL PASO, TEX.—Upon application of Mrs. Annie M. Brett, the district judge has granted a temporary injunction restraining the Guarantee Trust Company, the International Exchange Bank and the law firm of Clarkfall, Hawkins & Franklin from selling $100,000 worth of bonds of the Southern Telephone Company to satisfy a debt of $11,000. Mrs. Brett organized what is known here as the New Telephone Company, but it has not yet been placed in operation. She borrowed money on the stock and gave the bonds as additional security. The bonds were advertised for sale to satisfy the indebtedness, but the sale was prevented by the writ of temporary injunction.

FALL RIVER, MASS.—The Fall River Automatic Telephone Company has paid its second dividend at the rate of 5 per cent. per year, and has a surplus left after charging off depreciation. Its copper toll line connecting with the New Bedford automatic exchange has just been completed, and the service is all that could be wished. With the opening of the Fall River Company's toll line the "Bell" announced a cut of 33 1-3 per cent. between these points.

FRANCHISES

SANTA BARBARA, CAL.—The Home Telephone Company of Los Angeles has been granted a franchise here.

SIOUX CITY, IA.—The Sioux City Company has decided to petition the mayor for a special election for the people to vote upon the company's proposition.

WHITMAN, MASS.—B. E. Waters, of the Automatic Telephone Company, has been granted a franchise here.

PORTLAND, ORE.—The Empire Construction Company, of Toledo, O., will renew its application for a franchise here, and the possibilities are that it will be granted.

HARTFORD, S. D.—The Union Telephone Company has secured a franchise to enter the town, and being unable to secure satisfactory terms from the Northwestern, has decided to put in a system.

BARRE, VT.—The Orange County Telephone Company has asked for a franchise here.

ELECTIONS

BIRMINGHAM, ALA.—The stockholders of the People's Home Telephone Company have elected the following directors: H. H. Stambaugh and A. E. Adams, of Youngstown, O.; Julius Vautrot, Jr., of Warren, O.; D. M. Foraker, of Cincinnati, O.; W. H. Hassinger, H. L. Badham and Henry B. Gray, of Birmingham. The officers are: H. H. Stambaugh, president; Henry B. Gray, vice-president; W. H. Hassinger, secretary, and A. E. Adams, treasurer.

FREDERICTON, CANADA.—The annual meeting of the New Brunswick Telephone Company was held here recently. The usual dividend of 4 per cent. on the capital stock was declared. It was decided to string a copper metallic line from Fredericton to St. John and from Moncton to St. John. The officers chosen for the ensuing year are as follows: President, Hon. A. G. Blair; vice-president, J. L. Black; managing director, Senator Thompson; secretary and treasurer, W. E. Smith.

SHERBROOKE, QUE., CAN.—The People's Telephone Company of Sherbrooke has elected the following officers: President, Lieut.-Col. Bernard, of Richmond; vice-president, C. H. Fletcher, of Sherbrooke; secretary-treasurer, T. R. Rider, of Fitch Bay.

HILLSBORO, ILL.—The Montgomery County Mutual Telephone Company has elected H. H. Zimmermann, of Harvel; A. K. Vandever, of Irving, and Dr. M. L. Moyer, of Hillsboro, to be directors for the next three years.

PERU, IND.—The Home Telephone Company has elected Dr. Yarling, president; Jerome Herff, vice-president; C. J. S. Kumler, secretary and manager, and directors in addition: L. B. Fulwiler, Joe Bergman, Dr. Griswold and Dr. Huff.

SWAYZEE, IND.—The Swayzee Co-operative Telephone Company, recently organized with a capital stock of $6,000, has elected the following directors: Eugene T. Ireland, Harrison Mark, Clement I. Goble, J. Hambler, Rue P. Henley, William Ammons and L. C. Pence.

SPRINGFIELD, MO.—At the annual meeting of the stockholders of the Home Telephone Company the following directors were elected: H. B. McDanail, F. J. Curran, A. J. Eisenmayer, W. D. Tatlow, E. B. Bentley, B. E. Mayer and C. O. Trask.

PATERSON, N. J.—At the annual meeting of the stockholders of the Paterson, Passaic and Suburban Telephone Company the report of the treasurer was presented, showing a good profit for the year. It was stated that the company intended to go on with contemplated improvements within a short time. The following stockholders were elected directors for the ensuing year: Charles W. Kline, Edward C. Stokes, Wayne Dumont, Barker Gummere, James W. Lindsay, Hugh H. Hamil, George A. Post, W. S. Hancock, Walter Bamford, Frank A. Demarest, James D. Patton, F. Samuel Sheldon and William D. Blauvelt. The directors afterward met and elected the following officers: President, Charles W. Kline; first vice-president, George A. Post; second vice-president, W. S. Hancock; treasurer, Barker Gummere; secretary, James W. Lindsay; assistant secretary, F. A. Demarest; counsel, Wayne Dumont.

BUCYRUS, O.—The stockholders of the Bucyrus Telephone Company held their annual meeting recently, at which the following officers were elected: Dr. John A. Chesney, president; H. S. Blair, vice-president; J. C. Hull, secretary and treasurer; A. J. Unger, manager; directors, E. Blair, Benjamin Shearer, Dr. John A. Chesney, H. S. Blair, W. H. Miller, J. L. Assenheimer and J. C. F. Hull.

COLUMBIA, PA.—At the meeting of the Columbia Telephone Company the following were elected directors: H. C. Young, Samuel W. Hinkle, Dr. S. S. Mann, C. E. Lenig, Dr. W. G. Taylor, H. M. Hall and Sumner Oberlin.

PHILADELPHIA, PA.—James E. Mitchell, president of the Bell Telephone Company of Philadelphia since 1895, tendered his resignation at a special meeting of the board of directors. U. N. Bethell, vice-president of the New York Telephone Company, was elected to succeed him.

ST. MARY'S, PA.—At the regular annual meeting of the stockholders of the Elk Telephone and Telegraph Company officers were elected as follows: Geo. W. Boyer, C. G. Wilson, B. E. Wellendorf, J. M. Schaefer, St. Mary's; P. J. Pontzer, Kersey; M. S. Kline, Ridgway; S. G. Latta, Wilcox. Geo. W. Boyer, president; C. G. Wilson, secretary and treasurer; G. W. Herrick, superintendent and general manager.

FRANKLIN, VA.—At a meeting of the stockholders of the Atlantic Coast Telephone Company held here the following were elected: President, W. N. McAnge, Suffolk, Va.; directors, W. N. McAnge and J. L. McLemore, Suffolk, Va.; M. H. Moore and R. J. Camp, Franklin, Va.; R. Howard, Newsoms, Va.; W. W. White, Boykins, Va.; T. H. Birdsong, Courtland, Va.; C. F. Bonney, Norfolk, Va.; L. J. Lawrence, Murfreesboro, N. C. The capital stock is $10,000. A long distance full metallic copper line will be built from Norfolk to Boykins, Va., via Suffolk, Franklin and Courtland.

COMBINATIONS

ELWOOD, IND.—E. C. Van Aukens, of this city, has purchased the Franklin telephone system.

KALAMAZOO, MICH.—R. C. and I. W. Packard, representing the Imperial Finance and Construction Company, of Toledo, O., were here recently

THE WEEK'S MESSAGES—Continued.

in conference with officers of the Citizens' Telephone Company, with the object of taking over this concern. It is understood a deal will be made by which the Packards will put in $150,000 and the company immediately commence the construction of a plant.

OXFORD, MISS.—J. W. Clark and E. L. Toale, of Hamilton, Mo., have purchased the Oxford Telephone Company from W. H. Harvey.

SPRINGDALE, WASH.—The Springdale and Cedar Canyon Telephone line has been sold by E. M. Denny and W. I. Reeves to O. U. Hawkins.

PERSONAL.

INDIANAPOLIS, IND.—Mr. L. T. Apple, formerly manager of the telephone department of the Varney Electrical Supply Company, has resigned his position with them and has accepted a responsible position with the Hipwell Manufacturing Company, of Allegheney, Pa. Mr. Apple is well known throughout the field as a thoroughly experienced telephone man. Rural telephone managers throughout the State will miss the assistance which he was ever ready to render.

LA GRANGE, MO.—Silas Lake, who is a stockholder in the Lewis County Telephone Company, and who is manager of the exchange at La Grange, recently went to Quincy to superintend the building of a line for the Lewis County Company.

JAMESTOWN, N. Y.—John H. Wright, secretary of the Warren Telephone and Telegraph Company, has been appointed superintendent of the Home Telephone Company of Jamestown, N. Y. Mr. Wright will divide his time between Jamestown and Warren, and will direct both plants.

BELLEFONTE, PA.—Charles Larimer, who has been in the employ of the Central Pennsylvania Telephone and Supply Company for some time, has resigned and gone to Clearfield, where he has accepted the position of assistant superintendent of construction for the Huntingdon and Clearfield Telephone Company.

OBITUARY.

PHILADELPHIA, PA.—Robert Hermann Foerderer, president of the Keystone Telephone Company, died at his summer home at Torresdale on July 26.

UNDERGROUND

NORTH BEND, IND.—At a meeting of the board of public works plans and specifications for underground conduits of the Central Union Telephone Company, according to resolution of the common council, were filed and approved.

MISCELLANEOUS

LINCOLN, NEB.—The new Independent telephone company has filed amended articles of incorporation, changing the name from the Western Union Independent Telephone Company to the Lincoln Telephone Company.

New Construction in the Field

TORONTO, CANADA.—The Toronto Telephone Company will begin operation in the near future with fifty subscribers.

MOSCOW, IDAHO.—The Interstate Co-operative Telephone Company is constructing a line to Viola. H. K. Moore is superintending the work.

ROCKFORD, ILL.—At a meeting of the directors of the Home Telephone Company it was decided to take up the matter of a building for the use of the company as an exchange and office building.

RUSHVILLE, ILL.—A. A. Barr, of Bloomington, is in the city engaged in making an estimate on the material that will be needed to construct the Rushville Telephone Company's new exchange.

TUSCOLA, ILL.—The Chapman Mutual Telephone Company of Newman, the Mutual, of Murdock, and the Farmers' Rural Company, of Villa Grove and Hayes, will construct a system here.

ALEXANDRIA, IND.—The Delaware and Madison County Telephone Company has completed a direct toll line connecting their systems in Delaware and Madison counties with Marion, touching the towns of Summitville, Fairmount and Jonesboro. The central energy system is being used and is giving excellent satisfaction.

FREDERICKSBURG, IND.—The Rural Telephone Company has its Martinsburg line completed, which gives it two separate metallic routes to Louisville and New Albany.

MOUNT VERNON, IND.—The Posey County Home Telephone Company will begin operating their new system by August 15 with 400 subscribers.

PORTLAND, IND.—J. L. Sisk, Samuel Brunson and W. R. Wheat, of Jackson township, are making efforts to secure a telephone line from Bryant to Brunson's Corner. The Home Telephone Company proposes to give telephone service to the farmers along this route.

ANTHONY, KAN.—The Southwestern Telephone Company expects to open its exchange at Carmen, O. T., in the near future with about seventy subscribers.

DOWNS, KAN.—The Downs Western Telephone Company is extending its toll line from Long Island north to Woodruff, and may build to points in Nebraska.

MARYSVILLE, KAN.—W. R. Evans is arranging to rebuild his entire system. He expects to install a 400-drop switchboard.

OAKLEY, KAN.—The Oakley Telephone Company has closed contracts for telephones with thirty ranchmen to the north of Oakley and will build the necessary lines.

LEXINGTON, KY.—James S. Brailey, Jr., of Toledo, secretary of the Central Construction Company, and A. L. Tetu, general manager of the Independent Long Distance Company, were in Lexington recently consulting with President George S. Shanklin, of the local company, and many of the toll lines from this point are to be extended.

MINERVA, KY.—The Mutual Telephone Company will put in a switchboard at Minerva and run a new line from Tuckahoe to Dover.

CALAIS, ME.—The Forest Telegraph and Telephone Company will open a line to Eastport in the near future, and after the trunk is built the company will put in city service. This company opened eleven miles of new line recently. Service was opened this spring with the towns of Pembroke and West Pembroke. The building of fifty miles of new trunk line is anticipated for the summer.

OXFORD, ME.—The Oxford Telephone and Telegraph Company will probably extend its line into South Hartford.

PLATTSBURG, MO.—The Clinton County Telephone Company is building a farmers' telephone system in Clinton county, and expects to have 200 telephones in operation in the near future.

GENEVA, NEB.—C. H. Brown, of Grinnel, Iowa, president of the Fillmore County Independent Telephone Company, and Otto Wettstien, president of the Wettstein Construction Company, of Laporte City, Iowa, were here recently inspecting the work being done and planning new work for the company. Geneva is now connected with Fairmont, Exeter, Strang and Stickley through the Independent Telephone Company, and will soon be with all the towns in the county. Farmers' lines are also being rapidly constructed.

HAMMONTON, N. J.—The officials of the Interstate Telephone Company are securing the right of way through Hammonton to erect trunk lines from Atlantic City to this place, where they will connect with the Eastern Telephone Company, which will build from Camden to this point.

ITHACA, N. Y.—Telephone connections have been opened with Groton, Moravia, Locke, Ludlowville and South Lansing by the Ithaca Telephone Company.

JEFFERSON, N. Y.—The Jefferson Telephone Company is extending its line from Summit to Richmondville, and also setting poles for a line from Jerome to connect with the main line.

STAMFORD, N. Y.—The Rose Telephone Company has rebuilt its telephone line to Stamford and purchased the Sharpe line.

SYRACUSE, N. Y.—The Syracuse Telephone Company plans the expenditure of about $300,000 for the betterment of its service. The intention is to double the present exchange system.

ARCADIA, O.—The Arcadia Mutual Telephone Company will soon set poles in Arcadia and the north line will soon be connected with the central office.

NEWARK, O.—The Newark Independent Telephone Company is rebuilding its exchange at Granville. The system there will be extended and several farmers' lines will be run out of Granville. An additional line will be strung to Newark.

UNION, ORE.—The High Valley Telephone Company has asked for bids for supplying the necessary poles for the construction of its system. The line will run from this city to High Valley.

CANTON, PA.—The Canton Telephone Company has established telephone communication with East Canton.

CLEARFIELD, PA.—The Huntingdon and Clearfield Telephone Company has connections with Osceola.

GETTYSBURG, PA.—The United Telephone and Telegraph Company is rebuilding its lines in this end of the county. It is also stringing a large number of additional lines.

THE WEEK'S MESSAGES—Concluded.

REYNOLDSVILLE, PA.—A farmers' telephone line will be built this summer from Knoxdale to Reynoldsville via Emerickville, and J. N. Miller, of Knoxdale, is now soliciting subscribers. A line is being constructed from Knoxdale to Brookville via Cool Spring.

KNOXVILLE, TENN.—J. C. Duncan, manager of the People's Telephone Company, announces that the line has been completed through to Jelico.

ENNIS, TEX.—The Independent Telephone Company will construct a line from here to Corsicana.

LLANO, TEX.—J. C. Hardin and J. C. Elkins, of Willow City, were in Llano recently in the interest of the new Willow City Telephone Company, of which C. J. Lee, of Willow City, and the above named gentlemen are directors. They will construct a line at once from Llano to Fredericksburg via Willow City.

KENOSHA, WIS.—A new telephone exchange will be put in by the Western Telephone and Construction Company for the Kenosha Citizens' Telegraph and Telephone Company.

CLARKSVILLE, TENN.—The Home Telephone Company, of this city, has completed its lines from Clarksville to Guthrie, Ky. The lines are being extended in several other directions.

CLEBURNE, TEX.—The Cleburne Telephone Company has begun active operations and is putting in poles, etc.

TRADE NOTES

The Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., and Chicago, Ill., has recently sold a 400 line new style generator call visual signal switchboard with complete protective apparatus to the Geiger Telephone Company, Churusbusco, Indiana.

The National Steel and Wire Company prides itself on the high grade galvanized telephone and telegraph wire that it manufactures. Few people realize when they look out of the car window and casually glance at the telegraph wires along the road that the telegraph, telephone and railroad companies have millions of dollars invested in their wires. Some of this is copper, but the greater part by far is what is called "BB" (Best Best) or "EBB" (Extra Best Best) iron wire. This wire requires special grades of raw material and special machinery for making it. It must bear the most severe tests for tensile strength, elongation and torsion; while at the same time it must be of low electrical resistance. The spelter used in galvanizing must be almost chemically pure, and must also be applied so carefully that it will not crack or peel when the wire is bent or twisted. It must stand the tests prescribed by the engineers of the Western Union and Postal Telegraph Cable Company, and of the great telephone companies, whose lines cover the continent and whose requirements must be met. All of these requirements are absolutely essential, and it is on that account that telegraph and telephone wires are classed among the high grade products that the National Steel and Wire Company manufactures.

The Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., and Chicago, Ill., has issued another of its series of instructive bulletins. This one, No. 4, deals with Generator Call Telephones. The book contains descriptions and the code numbers of the generator call telephones manufactured by the company. The illustrations are fine half-tone cuts, printed on coated paper, which gives a rich, pleasing effect. In the rear of the bulletin are given some diagrams and descriptions of divided circuit, central checking and party line selective telephone apparatus, which should be of great interest and value to persons operating magneto call systems. Photographs and descriptions of the various parts that enter into the construction of magneto call telephones are also provided in the rear of the publication.

An extract from the notice in the bulletin will not be out of place: "We have abandoned the idea of publishing a complete catalogue, owing to the many classes of trade which we have to supply and also because it is impossible to keep a book of this nature up to date, and instead are publishing bulletins which we are pleased to mail at all times to interested parties. These will be gotten out on the loose leaf method and new bulletins or new sheets will be forwarded from time to time to customers and other parties on request."

The company is also publishing a perpetual price list on the loose leaf method, which covers the various lines of their manufacture. These will be sent to anyone interested on request. The series of bulletins being issued by the company are the work of F. L. Martin, its advertising manager.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

TELEPHONE EXCHANGES.—Two first-class telephone exchanges for sale. One 180, the other 200 telephones. Also 20 miles of metallic and 30 miles of grounded toll line. All standard construction and in first-class condition. Net income over $4,000 per year. Price $15,000 cash or good paper. No trades considered. Address UNITED TELEPHONE CO., Malden, Mo.

COUNTRY TELEPHONE SYSTEM in Illinois.—This is a rare chance for the right party, it includes: Franchises. nine exchanges and nearly 100 miles of metallic toll line. Address BOX 62, care The American Telephone Journal, New York.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

SALESMAN—Wanted, experienced telephone and switchboard salesman. One with established Northwestern trade preferred. No applications considered except those giving full particulars. Address BOX 65, The American Telephone Journal, New York.

POSITION—Wanted, position as manager or wire chief. Five years' experience on inside and outside work. Thoroughly understands central-energy and magneto systems. Best of references. Address BOX 66, The American Telephone Journal, New York.

SWITCHBOARD DROPS.—Wanted, 200 Western Express Switchboard drops; each drop is individual and self-contained. Address Box 71, The American Telephone Journal, 116 Nassau Street, New York City.

ELECTRICIAN—A first-class electrician wanted who thoroughly understands his business and who is competent to take full charge and care of an exchange of 600 subscribers; must be a good man; none other need apply. Address Washington Telephone Company, Washington, Iowa.

EXCHANGE WANTED—Would like to purchase a telephone exchange in a good live town; one in the west preferred. Writer would accept a position as manager of an exchange. Address BOX 63, The American Telephone Journal.

POSITION.—Competent telephone man desires position; six years' experience in both inside and outside work. Thoroughly understands common battery and magneto systems. Best of references. Address BOX 60, care The American Telephone Journal, New York.

THE LIBRARY OF CONGRESS desires to secure Volumes 1, 2, 3 and 4 of The American Telephone Journal for its file. Parties who may have these volumes, or parts of them, which they would like to dispose of, please communicate with the LIBRARIAN OF CONGRESS, Washington, D. C.

POSITION.—At liberty after Sept. 1, a competent telephone man. Want position as manager. State salary you can pay and what you want for your money. Address M. L. GAY, Union City, Ind.

POSITION AS TROUBLEMAN; have had seven years' experience as local and long distance telephone troubleman, and also fire alarm troubleman; Minnesota or Dakota preferred. ddress BOX 50, care The American Telephone Journal, New York.

The American Telephone Journal

VOLUME VIII *SATURDAY, AUGUST 8, 1903* *NUMBER 6*

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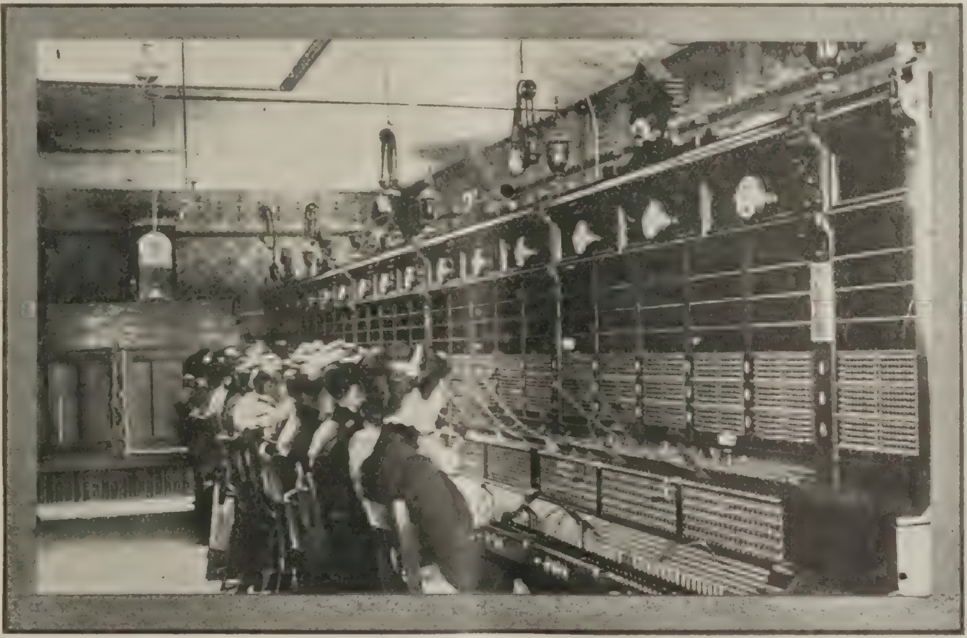
NOVEL FEATURES OF A SWEDISH SWITCHBOARD

By Frederick A. Wegner.

An example of the attention that continental telephonists give to detail is a magneto switchboard of Swedish manufacture which recently came under the observation of the author. Many refinements are incorporated in its construction which the American telephone switchboard engineer would consider of doubtful value, he holding that the complications attending the installation of these refinements more than offset the gain, in time saved and in simplicity in operation. It is interesting to note, however, the practices of the different nations regarding switchboard construction, and for that reason it is hoped that the article will be of interest to telephone men in this country.

The photograph gives an excellent idea of the general appearance of such a board. Each operator handles the calls of 100 subscribers whose line signals are directly in front of her. The corresponding answering jacks are mounted on a board which is placed at an angle. Each jack is in a direct line below its line signal. A subscriber in calling the exchange throws the drop. The operator answering takes the answering plug, shown in the photograph on the lower shelf, and inserts it in the answering jack, at the same time restoring the shutter of the line signal with her index finger. The jacks and signals are so arranged that all of them are the same distance apart, and all can be restored by exactly the same movement of the index finger. The listening key is now thrown toward the operator, who, upon getting the number to which the subscriber wishes connection, inserts the calling plug into the proper jack. The ringing is accomplished by throwing the combination key in a position opposite to that when listening. There is no ringing back into the ear of the calling subscriber. The circuits are so arranged that the calling subscriber can communicate without interference further orders to the operator while she is ringing the called subscriber. The busy test is so designed that both the sleeve and tip of the plug will give notice of a busy line. The test is very even and distinct, and is free from the annoying click common to some systems. Whenever a called party is rung up with a ringing key, a circuit is established which operates a clock-work counter which registers approximately the number of calls handled by each operator. There is one of these registers at each position. The device will register up to 10,000 calls, when it can be reset.



Swedish Switchboard. Notice the peculiar arrangement of plug shelves and of the answering and multiple jacks.

Clear out or supervisory signals are associated with both cords. This makes it possible for either party to send in a clearing out signal. This signal consists of a shutter which, when actuated, discloses the number of the cord corresponding to the clearing out signal. When the conversation is finished, and the calling plug returned to its seat the shutter of the clearing out signal automatically restores itself. If one of the subscribers wishes to give directions to the operator before the conversation is finished, the generator at the telephone may be turned, which will throw the clearing out signal. After ascertaining what is wanted the operator can restore the clearing out signal by pressing a plunger which is placed directly in front of the supervisory and immediately above the line signals. It is evident that the operator can make a new connection, and restore the clearing out signal without removing both the plugs from their jacks.

There are 18 sets of cords, 18 clearing out drops and 18 plunger buttons to each position, which automatically restore the clearing out drops. Directly above the answering cords on an inclined shelf the calling cords are seated. Both the answering and calling cords are equipped with 3 sets of auxiliary buttons. All of these may be operated when the key is in the listening position. The first locks upon being depressed. This throws the generator current on the line. The second button is for talking on either cord. It cuts out one of the subscribers and leaves the other in connection with the operator's telephone set. The third button is for the purpose of throwing out on the line a rapidly pulsating current when a subscriber who has been using the telephone forgets to return the receiver to the hook. The current makes a loud humming noise in the receiver, which will attract the subscriber's attention to what he has forgotten. There is a visual vibratory shutter in the generator circuit on the key shelf which performs the same functions as the ordinary buzzer. It is used to show the operator, when she is calling a party, that the circuit is working correctly. In front of the operator are two small buttons. The one on the right is for the purpose of making a battery test on the transmitter side of the operator's telephone circuit. The operator, on taking her position, can test the circuit to see if it be dead or open, and ascertain if everything is as it should be. There is no battery through the transmitter circuit except when the listening cam is thrown or this button is pressed. The button on the left, when pressed, cuts out the secondary coil of the operator's telephone set, opens the transmitter circuit and puts the operator's receiver directly across the line. Whenever a line is noisy this gives the operator all the current possible through her receiver.

On each section there are two night bell buttons, one of which cuts in or out the night bell circuit on the 300 line signals. The other cuts in or out the night bell circuit on the 54 clearing out drops. There are also two buttons which may be made to cut in or out the hand or power generator. The multiple jack sections as installed each contain 1,500 jacks. Space is provided for an additional 2,000, which gives the board an ultimate capacity of 3,500 subscribers. The operator's telephone sets for day service consist of a breast plate transmitter and a head-gear receiver. For night use each section is provided with one hand micro-telephone, which is attached to the ceiling above the center of each section. It is arranged with a weighted cord so that it may be lowered when in use and raised out of the way when not. Any of the 300 subscribers in the section may be answered from any position in the section when traffic is light by means of this instrument.

At the rear of the board the multiple wires are run in the shape of weaves instead of cables. This makes them very easy of access in case it is necessary to repair or test them. The cables are taken from the multiple jacks to the intermediate board, which is arranged in the lower part of the switchboard, of which it forms a part. The usual removable panels to protect the wiring in the back of the switchboard are provided. To enable the operators to quickly trace out any particular cord when there are many connections up, the cords are arranged in three sets of six colors each, and all the plugs are colored alternately black and red.

TELEPHONE EXCHANGE ENGINEERING—ARTICLE XI

WIRE CHIEF'S DESK CIRCUITS

By Ray H. Manson, Albion D. T. Libby and Charles A. Simpson.

Fig. 15 is the wire chief's connecting cord circuit, and is used in connection with the testing trunks to main distributing frame, Fig. 16. It is also used to enable the wire chief to call and talk with another operator, either the chief operator or monitor, over circuit, Fig. 14 (lines between desks); also to call and converse with a local operator or a local subscriber over a line to the multiple board, Fig. 9. It is also used in connection with "lines to toll board," Fig. 19. The retardation coil of this cord circuit is used to cross the line when either one of the plugs is inserted into the jack of a line to the multiple board, Fig. 11. When the line is short-circuited, by pressing the retardation coil key the line relay is drawn up and the lamp lighted in front of one of the local operators, who answers the call in the regular manner. If one of the local operators calls the wire chief over the circuit, Fig. 9, he will plug with the answering plug of this cord circuit, and when the retardation coil key is thrown, the supervisory signal in front of the local operator is extinguished in the regular manner.

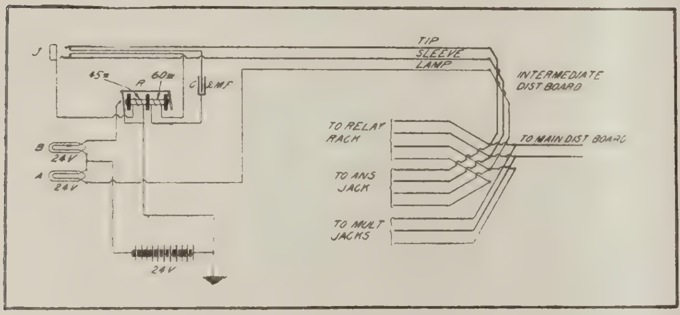


Fig. 11—Chief Operator's Circuit.

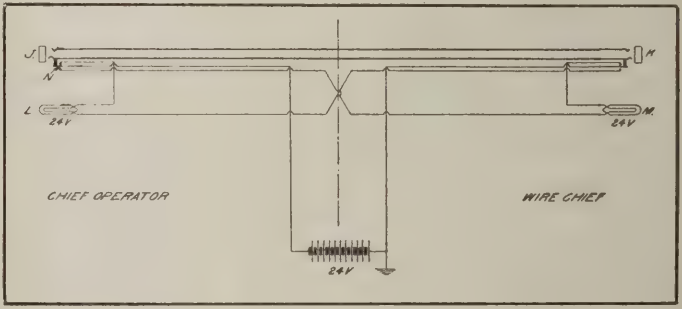


Fig. 14—Circuit—Chief Operator to Wire Chief.

When the cord circuit is used in connection with Fig. 19 the retardation coil is not essential, except to give supervision on the toll operator's local cord, as the act of plugging into jack *J* at the wire chief's desk lights a lamp in front of the toll operator, who answers the call in the regular manner. If the toll operator is calling the wire chief, the act of plugging into jack *K* will light the lamp on the wire chief's desk, and when he inserts the answering plug of his cord circuit, Fig. 15, the lamp is extinguished, since this current is broken at the jack.

The desk lines to local board, Fig. 9, are also used to extend from the wire chief's desk to the main distributing frame, at which point they can be cross-connected to any line in the exchange. By this means any subscriber can secure connections with the wire chief, the call being handled in the following manner: The subscriber calls central and tells the operator that he desires a connection with the wire chief. The operator will plug into the jack *C*, Fig. 9, with her calling plug and ring. This will operate the No. 8 relay and light lamp *b* at the wire chief's desk who, on answering the call, restores the relay to its normal position in the same manner as described under "Chief Operator's Circuits." It will be seen that the lamp will be put out, and when the retardation coil key of the wire chief's cord circuit is thrown, the supervisory lamp in front of the subscriber's operator will be put out. The wire chief then throws his listening key and talks to the subscriber. After completing the conversation, the retardation coil key is returned to its normal position and the subscriber's operator gets both the disconnect signals and removes both of her plugs. The wire chief can call on the multiple board by plugging into jack *D*, Fig. 9, and by throwing the retardation coil key short-circuits the line and lights

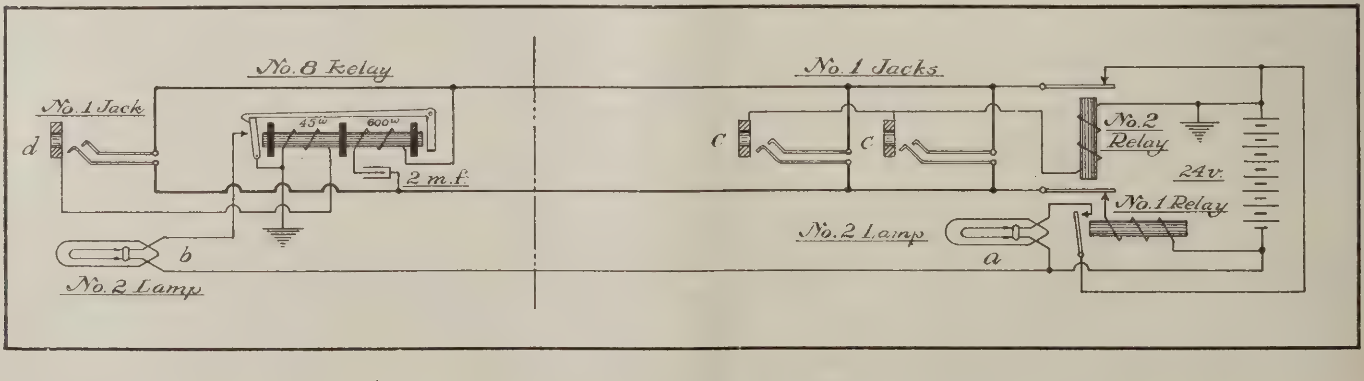


Fig. 9—Chief Operator's Lines to Multiple Board.

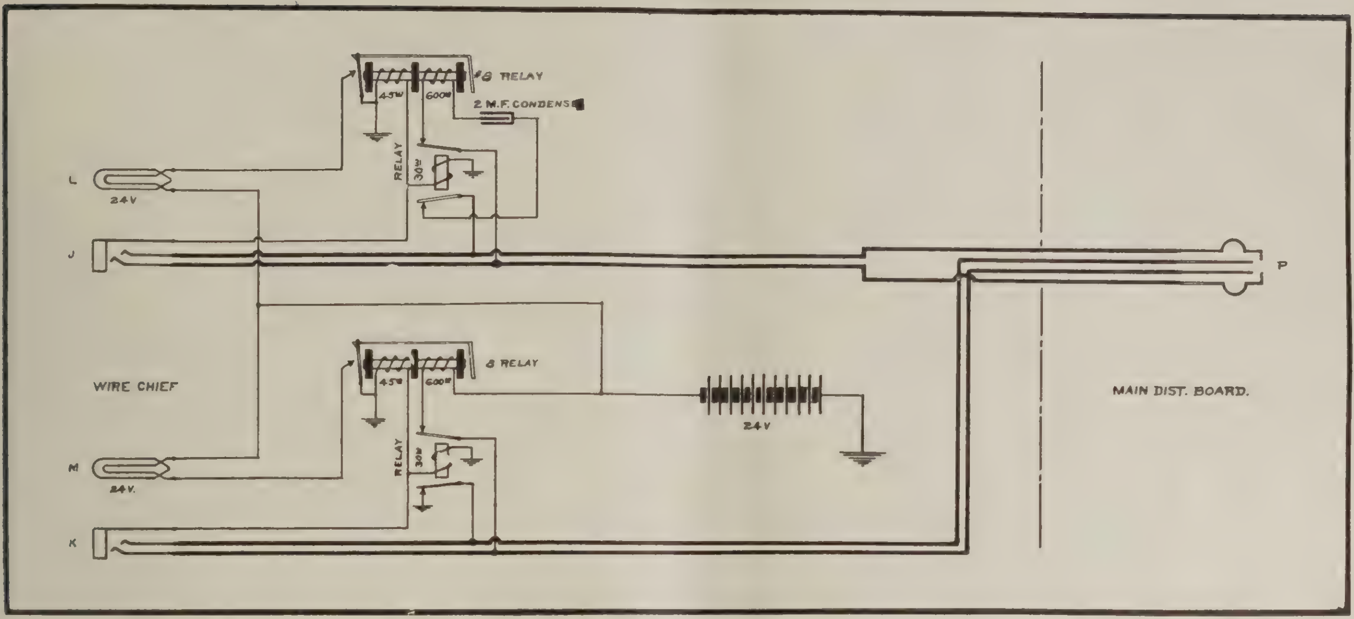


Fig. 16—Wire Chief's Testing Trunks to Main Distributing Board.

the line lamp in front of one of the local operators, who answers the call the same as any other.

Fig. 16 shows the testing trunks from the wire chief's desk to the main distributing frame. When the four-way plug *P* of this testing circuit has been inserted between the terminals of a line, in place of the sneak current arresters, calls to or from the switchboard will be carried to the wire chief's desk in the following manner. When the receiver is taken from the hook, the line relay is drawn up and his line lamp lighted, at the same time battery flows through a 600-ohm winding of the No. 8 relay, the back contact of the 30-ohm relay, both relays being at the wire chief's desk, out to the main frame, thence to the subscriber's instrument over the ring side of the line, back over the tip side of the armature and back contact of the 30-ohm relay to ground. This will operate the No. 8 relay and light lamp *M* in front of the wire chief, who will answer the call by inserting an answering plug of his cord circuit, Fig. 15, into jack K Battery will then flow through the 210-ohm resistance coil connected to the sleeve of the plug, to the sleeve of the jack to ground, through the 30-ohm cut-off relay, the 45-ohm self-restoring winding of the No. 8 relay, which will be restored to its normal position, and the lamp extinguished. Should one of the local operators be calling the subscriber when this testing plug is on the line at the main frame, she will, in ringing the subscriber, ring down the No. 8 relay. This will light lamp *L*, and the wire chief can come in on the circuit by plugging into jack *J*.

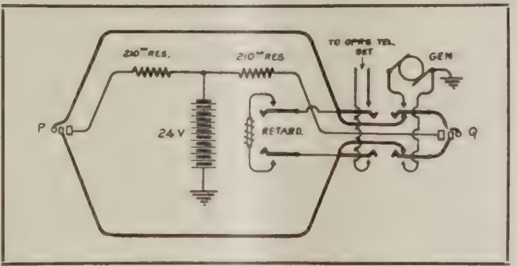


Fig. 15—Wire Chief's Connecting Cord Circuit.

This circuit, besides providing means for testing any exchange line, when used in connection with the testing cord circuit, Fig. 18, can be used by the wire chief for observing service on the line of a subscriber who complains, as it is sometimes advisable for the wire chief to have a chance to observe such a wire in place of the chief operator, who, we have seen, is able to watch this service by means of circuit, Fig. 11.

"Testing trunk to local board, Fig. 17, should always be used in connection with the testing cord circuit, Fig. 18. When a line does not work properly the trouble will be reported by the local operator to the chief operator, who will have one of these testing trunk plugs inserted into the jack of the line in trouble, and will send a slip to the wire chief stating the number of the line and the probable cause of trouble. When

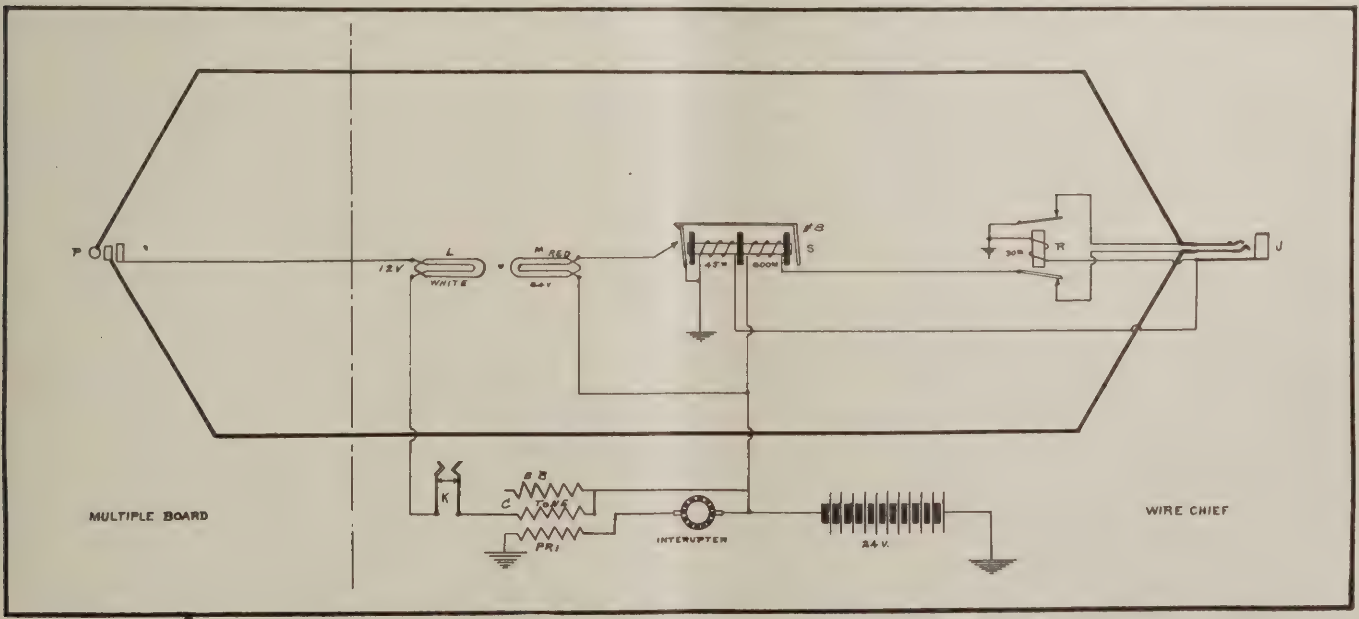


Fig. 17—Wire Chief's Testing Trunks to Multiple Board.

the testing trunk plug *P*, Fig. 17, is inserted into the jack, battery will flow through the interrupter and winding of coil *C* through key *K* and lamp *L* to sleeve of the plug, then through the cut-off relay associated with the line in trouble to ground. The cut-off relay will be operated, thus extinguishing the line lamp, at the same time lighting lamp *L* in front of the wire chief. This can be a white lamp to distinguish it from lamp *M*, which is provided with a red opal. The wire chief will, as soon as possible, insert the plug of the testing cord circuit, Fig. 18, into jack *J* of the testing trunk circuit, and make the necessary tests which will be described later.

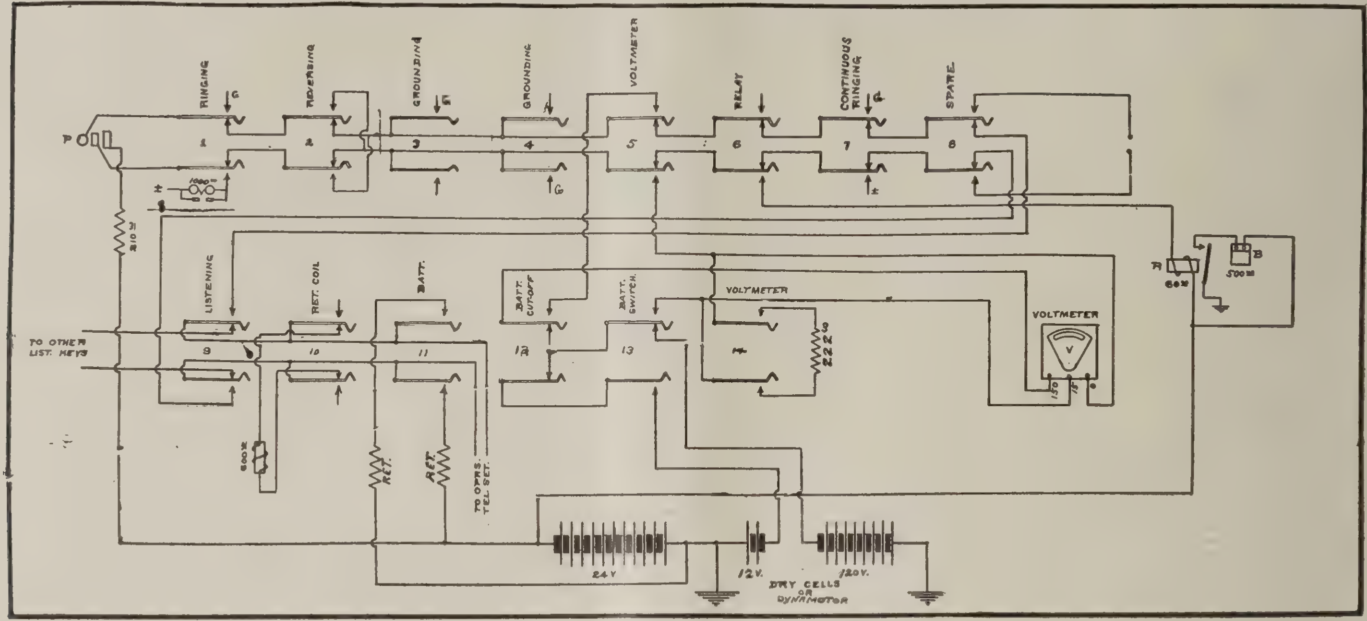


Fig. 18—Wire Chief's Testing Cord Circuit.

If, after the testing trunk plug has been inserted into the subscriber's multiple jack, or the wire chief begins his test, the subscriber takes his telephone from the hook, battery will flow through the 600-ohm winding of the No. 8 relay to one of the back contacts on relay *R* to the ring side of the testing trunk circuit, out to the subscriber's instrument, back over the tip side of the line and testing trunk to ground by way of the other back contact on the relay *R*. This will operate the No. 8 relay, and will light the red lamp associated with the testing trunk circuit. The wire chief will then answer the call, and in answering can make connection with the local board, if necessary, by means of the special connecting cord circuit, Fig. 15, over one of the desk lines to local board, Fig. 9.

If the wire chief is able to determine the trouble and clear it at once, he will order the testing trunk plug removed from the multiple jack over an order wire circuit. The extinguishing of the white lamp *L* will show that the plug *P* has been removed from the jack. In case there is a ground or cross on the line, it is necessary to send a lineman to clear the trouble. The testing trunk plug is left in the subscriber's jack so that the line man can signal the wire chief by crossing the line with his telephone set. This will light the red lamp in the same manner as when the subscriber removes his telephone from the hook, as previously described. When plug *P* is inserted in the jack of the line in trouble, a "tone" is put onto the sleeves of the jack by means of the high speed interrupter which will be described later, and coil *C*, so that should any of the local operators test this line in order to make connections, they will at once hear the tone produced by the interrupter, and will know that the line is in trouble, and they will not plug into the jack. The key *K* is used to open this tone test circuit. The coil *C* is used as a busy back and tone test transformer. The winding *BB* is used for the busy back, and the one marked "tone" is used as a tone test by first feeding battery to the lamp and cut-off relay and secondly by "picking up" the tone from the primary. The resistance of the tone winding is 120 ohms, so that the circuit through the lamp carries 1-10 of an ampere and the lamp *L* remains lighted as long as the plug is up at the local board.

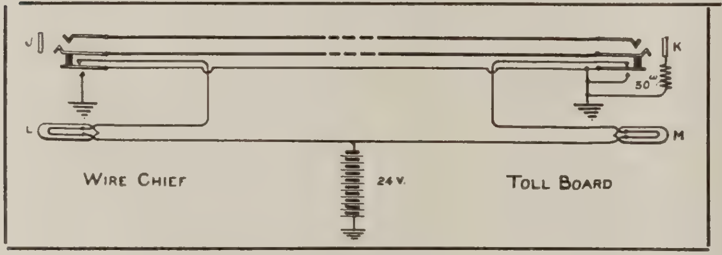


Fig. 19—Wire Chief's Line to Toll Board.

If the wire chief finds that the line lamp is permanently lighted, due to the subscriber leaving his telephone from the hook, he will plug into jack *J* of the testing trunk circuit, Fig. 17, with plug *Q*, Fig. 20. Then by throwing key *K*, a high pitched and powerful current is thrown on the line, which causes the diaphragm of the subscriber's telephone to vibrate very rapidly and thereby producing a "howl." Consequently, this circuit is designated as the "howler" circuit. As shown, there is a high speed interrupter wired, one side to ground and the other to key *K* and through the primary of an induction coil. The windings of this induction coil are of comparatively low resistance, but have a very high inductance. The primary of the coil used is the outer winding, and measures approximately 12 ohms. The inner coil is used as a secondary and measures 9 ohms. The interrupter is built up of 40 segments, 20 live and 20 dead, and runs at the speed of the ringing machine approximately 1,000 R.P.M. With this combination it has been found that there is a slight spark on the brushes of the interrupter, and that the effect on the telephone is excessive. The ½ M.F. condenser across the secondary of the coil eliminates both of these objectionable features. It will be seen that the key *K* opens the primary circuit. This is to prevent any noise being produced on the battery discharge leads due to the commutator note from the high speed interrupter. The slight noise only lasts for a few seconds, as the time taken by the subscriber to replace his telephone, when this circuit is used is measured in seconds. Howler circuit plugs and keys, are placed on the wire chief's desk and usually on one position on the switchboard.

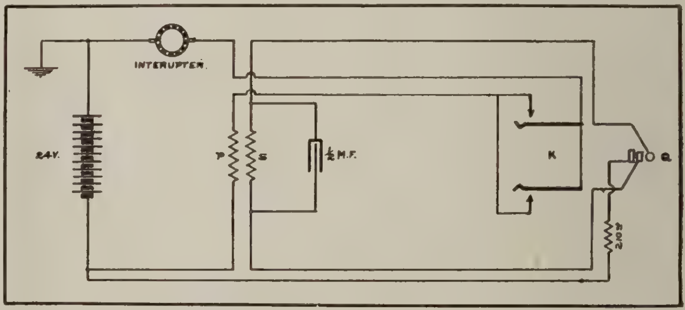


Fig. 20—Howler Circuit.

In the next paper the manner of making the various tests with the apparatus described will be taken up in detail.

METHODS OF INDIANA STATE TAX BOARD

By R. D. Fisher, *Special Correspondent.*

The Indiana State Board of Tax Commissioners began a fifty days' session on the 13th of July. The purpose of this annual meeting is the fixing of the annual assessment for taxation of all the property of steam and electric railways, telegraph, telephone, express, sleeping car and pipe line companies upon which, by law, the State Board is authorized and required to make original asssessment and the hearing of appeals and applications for revision of assessments as formerly fixed by the county and township assessors. The following dates have been fixed for the hearing of the statements relative to telephone companies: July 28, 29 and 30. The system of taxation of corporation property in Indiana has attracted a good deal of favorable commendation and other States are adopting similar laws. The assessment of personal property of telephone companies is fixed by the township and county assessors. Telephone companies are taxed on their capital stock, earnings, miles of poles, miles of wire, franchises, etc. The character and condition of the poles and wire, size, kind, length of time in use and cost per mile is considered.

Telephone companies are required to file an annual statement covering the past year ending with March 31 showing the amount of capital stock, miles of poles and miles of wire by townships, the average height of poles, kind and cost per hundred, the kind and size of wire, length of time in use, the number of wires on each line of poles and the cost per mile for constructing the line. The number of business telephones and the number of residence telephones in use and the average charge for each service must be stated. They are required to report the gross and the net earnings, the amount paid out in salaries to officers, the amount paid for labor and the amount paid for materials, office and station expenses, rents, interest and royalties. In case a company puts all its net earnings into extensions or improvements of the plant it escapes taxation on that item.

There, are 154 telephone companies operating in Indiana, which come under the authority of the State Tax Board and their aggregate capital stock runs up into the millions, proper allowances being made for bonded indebtedness. The Board fixes the assessment from these annual reports and forwards the same to the companies. Any company dissatified with the assessment fixed by the Board may ask for a reassessment by stating explicitly the grounds upon which the appeal is based and a date is fixed when a representative of the complaining company may be heard. The Board frequently makes satisfactory reductions upon complaints founded upon distinct and well grounded reasons. The Tax Board consists of the governor, secretary of state, auditor of state and two tax commissioners appointed by the governor.

RAPID MAGNETO TO COMMON BATTERY CUTOVER

In a recent issue of The American Telephone Journal an article was printed, giving the details of a method of cutting from a magneto to a common battery system. Herewith we present an outline of another scheme that has been used successfully:

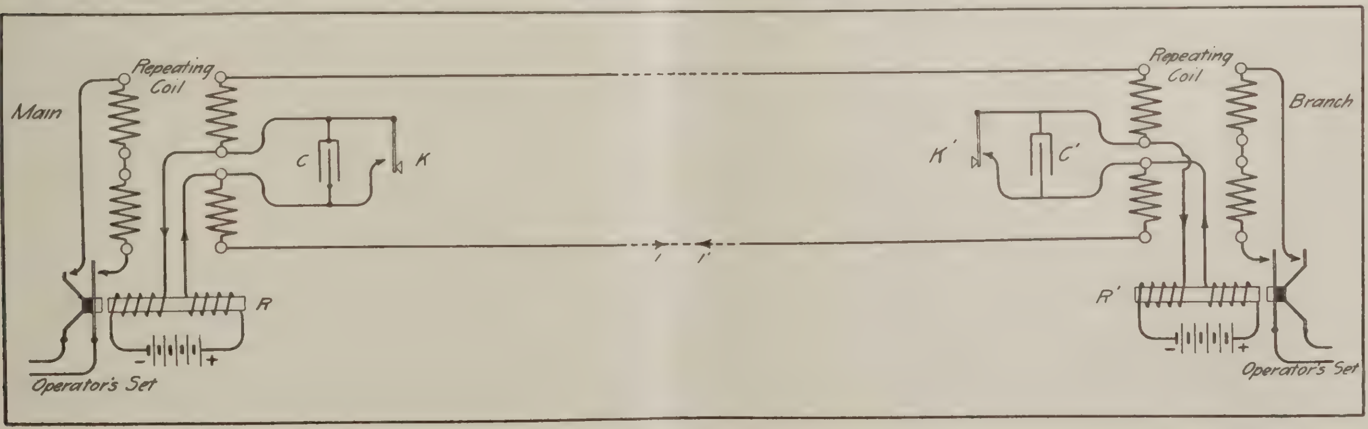
At some convenient point a set of cables is spliced on to the existing wire plant and carried to the new switchboard and terminated on the intermediate distributing board. The actual transfer from the old board to the new one may be very conveniently made by opening all of the relay contacts with little strips of paper. These strips may be tied together with string, and when the transfer is finally made, a jerk on the string will remove all the paper strips, placing the relays in service. If the distributing board serving the magneto switchboard contains protectors the old switchboard may be cut out by pulling out protectors, either fuses, carbons or heat coils, as the case may be, or the jumpers on the distributing board, if there are no protectors, may be cut. Still another method where the old board is a series multiple is to plug open the answering jacks with cork or wooden plugs; by either of these methods the change from a magneto board to a common battery board may be made if carefully planned, with a trained adequate force, in a few seconds' time. The Chicago main office of 5,400 subscribers was cut over by this method in 47 seconds, the North office in 25 seconds, and the West office in 15 seconds. Englewood and Lake View were cut over in about the same time.

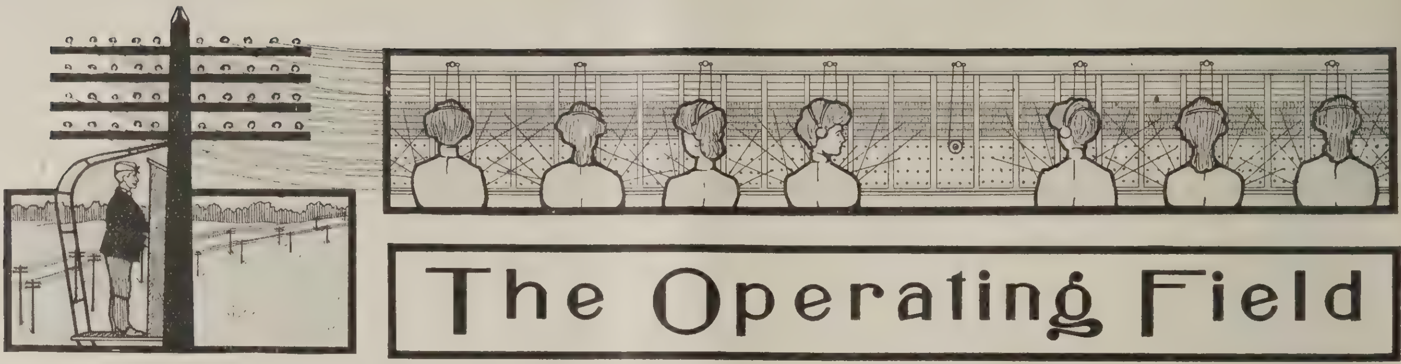
AN ORIGINAL TWO-WAY ORDER WIRE CIRCUIT

By J. B. Middleton.

Often it is desirable to use an order wire between two exchanges, but yet the telephonist does not care to give two circuits to the arrangement. The writer has devised several circuits which will work both ways, but they were all more or less noisy on account of earth currents. The one herein presented, however, has proven entirely practicable, and is in use between a 1,500-ohm multiple switchboard and a branch exchange. It will be noticed from the drawing that a relay is required at each end. If your plant is not common battery dry batteries will serve the purpose admirably. Care must be taken, however, to see that the voltages of both batteries are about the same. It is evident from the drawing that the circuit is perfectly balanced, the batteries and relays both being at the centers of the repeating coils. The operation of the circuit is as follows: Normally the batteries oppose each other, as indicated by the arrows; therefore no current flows through the relays R and R^1. If either of the keys (K, K^1) be pressed, current from both batteries will flow through the key, the armatures of the relays (R, R^1) will be pulled up and the circuits completed. This will cut the operator's telephone sets together. It will be noticed that there are no grounds on any part of the circuit which insures freedom from earth currents.

Two-Way Order Wire Circuit.



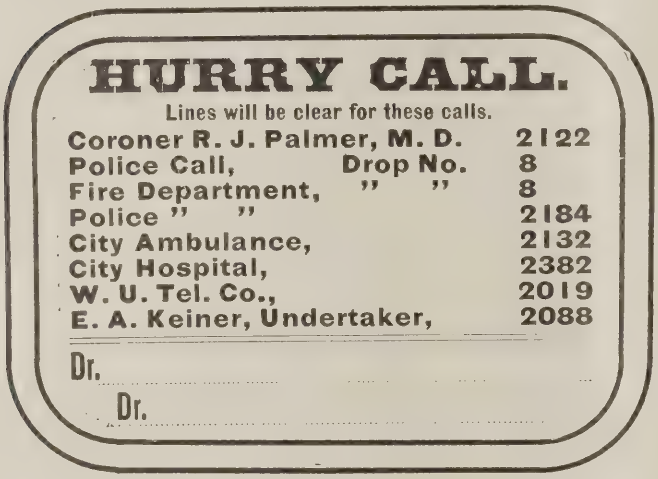


The Operating Field

A HURRY TELEPHONE CALL CARD.

By A. C. Scribner.

THE illustration gives a very fair idea of the appearance of the card. The outside rim is of light metal and the portion which is printed on is of heavy cardboard, which makes the card very serviceable. The cards are designed to be placed upon the telephone either under or over the transmitter. The numbers of the telephone most likely to be called for in case of an emergency may be placed in the appropriate blank on the card. There are spaces arranged for the subscriber's regular family physician and also for the physician that would be called in case it was impossible to reach the family physician. In front of each operator at the central office one of these cards is placed. The operators are instructed to give the calls on this card preference to any calls that may come in.



HURRY CALL.

Lines will be clear for these calls.

Coroner R. J. Palmer, M. D.		2122
Police Call,	Drop No.	8
Fire Department,	" "	8
Police " "		2184
City Ambulance,		2132
City Hospital,		2382
W. U. Tel. Co.,		2019
E. A. Keiner, Undertaker,		2088

Dr.

Dr.

Invariably when anything unusual happens at or near a subscribers' station, such as a fire, accident, death or burglary, the subscribers become confused and cannot find the numbers in the directory which they wish to call. If a card like that illustrated be in front of the subscriber so that he cannot help but see it many valuable moments will be saved.

CANADIAN ALDERMEN CRITICISED.

AN action recently taken by the Finance Committee from the Board of Aldermen of Hamilton, Ont., in opening up negotiations with the Bell Telephone Company for another long term franchise agreement is being adversely criticised. The people of Hamilton generally are not anxious to gather in whatever money the Bell Company may be willing to pay to secure absolute rights in city streets for a long term of years to come, says the *Spectator*. The great anxiety in the matter seems to be on the part of the Aldermen, and why they should be so very much interested in a matter that is not at all agitating the public mind is one of those problems to which it is difficult to find an answer. Under the existing no-agreement arrangement the citizens are no worse off than they were before in the matter of telephone rates. The city treasury suffers, but in so small a degree that it is not worth consideration when the importance of the whole question is taken. It is suggested that if, instead of making a wild rush to negotiate for a new agreement with the Bell Company, the Aldermen were to place upon that company those restrictions which it is fairly entitled to bear, such as pole rentals, they would be engaged in better business for the city.

WOULD ENJOIN CITY FROM TAKING STOCK.

By R. D. Fisher, *Special Correspondent.*

QUITE a sensation was produced at Evansville, Ind., by the filing of a suit in the Superior Court by ex-Judge Richardson to enjoin the city from taking stock in the new municipal telephone company or from executing any rights as stockholder under the attempted subscription already made. He seeks also to enjoin all city officers, as well as directors of the Municipal Telephone Company from taking any steps pursuant to orders or contracts by or between the city and the telephone company, on the grounds generally that the municipal telephone scheme is illegal and would entail a heavy debt on the city and render it liable financially in case of failure of the company. The estimated cost of the municipal plant is $300,000. The city has subscribed for $175,000 of the stock, the plant eventually to become the property of the city after all other stock is retired. The scheme is unique, nothing like it is said to be in existence in this country. The officials of the Municipal company say that the Cumberland company is back of the suit and the plan is to delay the installation of the municipal plant.

COLORADO RAILROAD EXPERIMENTS WITH SIMULTANEOUS TELEPHONE SYSTEM.

EXPERIMENTS have been carried on for some time with a simultaneous telegraph and telephone system, which the D. & R. G. Railroad expects to revolutionize the method of telephone communication on its lines. This work, which is looked upon with interest by competing roads, has been carried on under the supervision of the National Telegraphone Company, and has given satisfactory results to date. The D. & R. G. is the first Western railroad to test the invention. Experiments were begun late in May by Superintendent of Telegraph W. B. Glardon, in conjunction with G. E. Milligan of the National Telegraphone Company. Tests were made between Salida and Minturn, a distance of 92 miles, and along the 72-mile stretch between Salida and Gunnison. Among other roads, the Santa Fe, in May, had made an experiment with a similar equipment between Topeka and Emporia.

NEW YORK INJUNCTION CASES DISPOSED OF.

THE Supreme Court of New York has applied to local telephone companies the rule, hitherto confined to long-distance telephone and telegraph companies, that a telephone company may not construct a line along a man's property against his wishes. The cases were those of William Gray against the

York State Telephone Company and Richard A. Gray against the same defendant. When the cases were first brought, temporary injunctions were granted restraining the company from constructing its lines across the premises of the complainants in Boone County. The injunctions have now been made permanent. The attorneys for the defendant company contended that the decisions previously rendered in similar cases did not apply in this case because the telephone company was being patronized by farmers in the vicinity of the contested property line, it being shown that seven farmers in the vicinity were subscribers of the defendant company and had telephones in their houses.

ELYRIA COMPANY TO INCREASE ITS CAPITAL.

THE stockholders of the Elyria (N. Y.) Telephone Company will meet on Saturday, August 15, to vote on the question of a proposed increase in the capital stock of the company from $50,000 to $100,000. The question of negotiating a loan of $50,000 and issuing bonds will also be taken up. The new money will be used for the purpose of installing a new central energy switchboard with additional capacity.

The company was organized in 1897, and has a bonded debt of $25,000. Its officers are: President, W. E. Brooks; vice-president, F. H. Sudro; secretary and treasurer, J. A. Dake; general manager, J. A. Dake. The company has over 900 exchange subscribers, and its franchises run for a period of twenty-five years. It has direct connection with the long distance lines of the United States Telephone Company.

MICHIGAN TELEPHONE COMPANY'S PROPERTY ORDERED SOLD.

THE United States Circuit Court, sitting at Detroit, Mich., has ordered the immediate sale of the property of the Michigan Telephone Company, covered by the mortgage of the old Colony Trust Company, of Boston, Mass. Objection was made to the immediate sale by the Michigan Company because a claim of $600,000, held by the Central Trust Company, the trustee of the bonds of the Detroit Telephone Company, absorbed by the Michigan Company, would prevent intelligent bidding. An arrangement was made that the syndicate that represents the bond holders of the company and is ready to buy the property is to take care of the claim of the Central Trust Company and also of the minority stockholders in the Michigan Company. As a result of this arrangement, the objection was overruled and the decree ordering the sale granted. No date of sale has yet been fixed.

A QUESTION OF FRANCHISES.

NEGOTIATIONS are in progress between the Mutual Telephone Company, of Des Moines, Ia., and the common council of that city, looking toward the repeal of the company's franchise and the adoption of a new one. The two provisions of the present franchise that are unsatisfactory to the parties are the provisions fixing rates and providing for the putting in of underground conduits. The city is unwilling to repeal the existing franchise before the acceptance by the telephone company of a new one, because under the decisions of the Iowa Supreme Court in Chamberlain v. Iowa Telephone Company, 93 N. W. 596, telephone companies have the right by the state law to occupy streets without the city's consent. The council fears that if the present franchise were repealed before a new one was accepted the company would refuse to accept the latter, and the city would be powerless.

COMPANY TO BE ORGANIZED IN MONTANA.

T. A. McCLAIN, of Missoula, Mont., is organizing a stock company for the purpose of putting in a local telephone system for the use of the farmers of the Bitter Root valley. Mr. McClain states that he can secure plenty of backing to finance the proposition. As soon as he secures a sufficient number of signers among the farmers of the valley for telephones work on the construction of the system will be commenced. There has been talk for the past three years of constructing a telephone system through the Bitter Root valley for the benefit of many ranchers and fruit growers of that section, and it is to be hoped that Mr. McClain will meet with sufficient encouragement from the fruit growers of the valley to assure him success.

SITUATION AT DETROIT.

PREVAILING uncertainty as to what should be the terms of the rate clause in any new franchise granted the prospective purchasers of the Michigan Telephone Company's plant extends to both parties in interest. The applicants are frankly in a quandary over the matter, while the Common Council is certainly not competent to fix a reasonable charge on the basis of information now in its hands. Only one thing is really settled to date, and that is that the property, after being sold by the receiver, will pass free from any obligations assumed in former franchises; that is, the old Detroit telephone ordinance is wiped out completely, and the new company is at perfect liberty to proceed under State law without consulting the city government in any particular, except as to the latter's exercise of authority in reasonably regulating the use of the streets.

SOME INTERESTING LETTERS.

IN the injunction case of the Nebraska Telephone Company against the city of Fremont, which came up for hearing in the district court at Fremont, Neb., last week, some old letters were read in evidence that show how greatly the expectations of the promoters of early Independent companies have been exceeded by the success achieved. They showed that the promoters of the old Fremont Telephone Company, the sale of whose franchise to the Nebraska Company was in dispute, expected to get no more than thirty or forty instruments to start with, and that the rates charged were to be from $3 to $5 per month. The cost of the plant was estimated at $1,300 to $1,500. The suit is over an injunction secured by the Nebraska Company last winter to restrain the street commissioner from chopping down poles, cutting wires and otherwise interfering with the construction and repair work of the corporation.

TOPEKA COMPANY ENLARGES ITS PLANT.

THE Topeka Independent Telephone Company recently received three new sections for its switchboard. They are installed by electricians sent by the makers of the board. When completed the new switchboard will have a capacity of 2,000 telephones. It now accommodates 1,500. Nine additional operators will be employed to serve with the twenty-seven now engaged.

A new board for the accommodation of toll lines has been purchased, and will be installed at the company's office. The present toll board will be used exclusively for handling business from the rural lines.

GOVERNMENT CONNECTS FORTS WITH TELEPHONES.

THE different forts located about Portland Harbor, Maine, are being placed in closer communication by the installation of a telephone system which will connect the different forts. The United States Government has chartered a tug to aid in installing the cables, and the boat is now engaged in the work. When the cables have been laid the different forts on both the cape and the islands will be in immediate communication with each other. This will be of the greatest assistance during the war game which will take place in August. The telephones will doubtless be a permanent fixture at the forts.

CONFERENCE OF NEW YORK MANAGERS.

THERE was a conference recently held of the local managers of the Utica Home Telephone Company, the Rome Home Company, the Little Falls Company and the County Telephone Company of Herkimer, N. Y. The purpose of the meeting was to discuss the toll question with the idea of fixing a uniform rate. At present each manager establishes the rate for the line he represents, and there is much confusion as a result. Nothing definite was fixed upon, but it is expected that a uniform schedule will soon be established.

The Editor's Page.

THE EXCHANGE MANAGER'S DUTY.

WE fear that in their efforts to carefully oversee the whole management of their exchanges, some managers are wont to overlook the real thing that they are selling—service—and allow it to take care of itself. It will be obvious to every well-informed telephone man that a logical management of the traffic operates in two directions, both of which are of great importance. If the traffic is carefully and continuously watched, it means that the work of operating is being well done, and that the exchange is giving its subscribers an accurate, prompt and reliable service. That the first function of a telephone exchange is to give its patrons such a service every telephonist will acknowledge. Yet how many telephone managers keep that axiom continually in mind? How many telephone exchanges every one of us know, where it is perfectly obvious that the management is thinking of anything else than that which should be its principal aim, the production of a thoroughly efficient service—a thoroughly efficient conduct of the traffic?

The more remarkable it is that this should be so because the sole object of the telephone exchange is to furnish telephone service, and it should naturally be the primary and important thought of the telephone manager to make his service as efficient as it can be made. The general tendency of telephone managers is unfortunately to devote too much attention to the things concrete and allow the traffic to care for itself. With a different policy, a policy in which the attainment of the highest efficiency in the conduct of the traffic should be the battle cry, almost everything else might be left to care for itself. Or rather such a policy would automatically compel everything else to be properly taken care of, since a thoroughly efficient service can not be given without a thoroughly efficient force and plant. The telephone system run on the lines here laid down will be the first really popular system to exist. And from the financial side we are sure that such an exchange would pay.

The reward for a manager who studies his traffic will be not alone a more efficient service but he will gain a more intimate and detailed knowledge of the operation of his plant, which will be of value to him in making him a better telephone man. The knowledge that he thus gains will be of the utmost value in aiding him in the general conduct of the business of the plant and in the best methods of operating it. Telephone traffic has many details entirely peculiar to itself. This is one of the reasons why such a close and persistent study should be given to it. It is the commodity in which the exchange deals, yet it is produced, or at least its production is started, outside the exchange and not within. The time and rate of production are wholly beyond the control of the exchange and under the control of the public.

Every supplier of public utilities must, in the long run, supply what they sell in the manner the public demands. But the telephone manager is at a peculiar disadvantage. The manufacturer can run his plant half time, full time or over time; can store the surplus produced or can even at times make the public wait. The railway or steamboat manager makes a table to which the public must needs conform. The telegraph manager takes your message and leaves you to guess what he does with it. But the telephone manager must always be ready to work full time and at full speed, and may be called upon to carry an overload at any moment. He has no storage, and cannot afford to get a reputation for delay. He may be called upon to make a hundred calls an hour or ten thousand in ten minutes, and every call is an individual operator to be handled as such. There are others, but these are a few of the reasons why a telephone manager should make the study of traffic his chief study.

SUBSCRIBERS ARE RESPONSIBLE FOR THE SERVICE.

IN previous issues of this paper the essential part that the telephone user plays in the operation of the plant has been pointed out, yet we feel that the subject is of sufficient importance to again be taken up from, possibly, a slightly different standpoint. Among the many peculiarities that telephone service enjoys is the distinction that it is the only public service in which the machinery is under the actual control of and is handled by the public. To be sure the public turns on and off its own electric light, gas and water, and occasionally a lack of proper apparatus or straightforward carelessness or ignorance, result in explosions, asphyxiations and other troubles even from these very simple operations. But in the working of the telephone service, to attain the efficiency that is generally aimed at, something more is demanded of the public than a simple mechanical operation such as turning a key or pressing a button. That something more is certainly not very complicated or extensive, but it requires a certain conscientiousness, a recognition of what is due to one's fellow subscriber and a spirit of helpfulness and co-operation that are too often wholly absent from the public operation of the telephone.

Flippant newspaper writers have, since the telephone operator first appeared, used her as a butt for their gibes and jeers. What newspaper writer stops to consider that in any telephone connection there must be co-operation between at least three persons—the calling subscriber, the exchange operator and the called subscriber—and that consequently the subscriber—the public—is responsible for two-thirds of the operating and the telephone operator for only one-third? The exchange operator does certain mechanical things under the instruction of the telephone user. If these instructions are not correctly and succinctly given, errors and delays arise; if the called subscriber does not respond promptly to the operator's ring, all that she can do is to continue ringing—she cannot get him to the telephone by force or hypnotic suggestion. If the caller leaves his telephone before the connection is established, he has to be rung up and brought back.

Although it is clear that the efficiency of telephone service lies at least as largely in the hands of users as in the hands of the telephone company, how many telephone users do we all know who habitually practice all the telephonic sins of commission and omission? Then there is the office boy, who is undoubtedly one of the most active curses of the telephone service. Both as a caller and as an answerer he is lax, inefficient, unintelligent and usually impudent in the bargain. It would seem if one were trying to design an individual that would be as unfit as possible for the use of the telephone, the average office boy would be the best thing in existence to use for a model. The habit of deputing the office boy to call some one up on the telephone and to get the person wanted on the line before the real caller goes to the telephone, is a most pernicious one, but it is difficult to get those who indulge in it to see that it involves both a wasteful use of the telephone plant and a gratuitous impertinence to the person that is called. There are few telephone experiences more aggravating than to be called to the telephone and be asked by a boy if you are Mr. So-and-So, and then told to wait a minute, that Mr. Blank wants to speak to you.

Telephone managers should do everything in their power to train their subscribers as well as their operators. This is a point that is quite generally neglected, but if telephone subscribers as a body could be impressed with the importance of scrupulous accuracy in giving numbers, of always answering the telephone as promptly as possible, of always remaining at the telephone until the called station answers, and of always making calls in person and never by deputy, there would be a general and very marked improvement in the efficiency of the telephone service.

FOREIGN CURRENTS

By "The Arrester."

A JOINT committee of the two Houses of Parliament is now sitting in London to enquire into the great question of municipal trading, a subject around which much agitation has raged for several years past. Of late years the English municipalities have been going in for electrical enterprise of all sorts, electric railways, lighting and power schemes and telephone systems, and since municipalities never operate on commercial lines nor keep accounts that show the true state of affairs, there has been much opposition from ratepayers who believe that private enterprise should be encouraged and municipal enterprise curbed. One witness, who said that his firm paid over $90,000 a year in rates, and was not represented in any way on the council, was emphatically of opinion that municipal trading discouraged private enterprise. He said that owing to legislation enacted in aid of municipal interests Great Britain was behind almost every other nation in Europe in respect to electricity in general, and in respect to the telephone service in particular. His own experience was that nearly every nation in Europe was far ahead of Great Britain with regard to the telephone service; that would not have been the case if private enterprise had been allowed to have a free hand in telephony in Great Britain. Another witness, who was described as the second largest ratepayer in Glasgow, severely criticized the methods of the Glasgow Corporation in the conduct of the tramway and electric lighting systems of that city. The telephone system had had too short an existence for him to give an opinion on the conduct of that branch of municipal service, but the municipal telephone venture had developed animosity between the Corporation and the National Telephone Company, and they had recently cut off the company from the municipal buildings altogether.

Portsmouth's New System

NEVERTHELESS there are evidently municipalities still in Britain that have not seen the error of their ways, for we learn that the Portsmouth municipal telephone system was recently inaugurated with a flourish of trumpets and a banquet. The ceremony took place in the Grand Jury Chamber of the Town Hall, which seems a curiously inappropriate place. The district covered by the municipal exchange contains an area of 100 square miles and takes in all the neighboring suburbs. The cost of the system, providing for 1,240 subscribers, was $131,800, and it has been found necessary in consequence of the continuous application for connection to apply for a further loan of $60,000 to increase the capacity of the system. The system having been duly explained by the experts, the Mayor declared it open, and said that he thought the municipal system connected the subscribers far more rapidly than did the National system. Rapidity and proper attention were the essence of the whole thing in a successful exchange. Mutual compliments, presents and a banquet made up the rest of the proceedings. A telephone message was received from the chairman of the Glasgow Telephone Committee, expressing the hope that the Portsmouth undertaking would prove as great a success as that of Glasgow. Probably in Portsmouth even more sanguine hopes are entertained. The Mayor in accepting a souvenir gift from the contractors, suggested that everyone should be able to have a telephone for $25, and that the charge of $29.30 should be reduced to that more convenient figure.

Telephones in South America

AT an annual general meeting of the River Plate Telephone Company, held in Winchester recently, some interesting facts relative to telephone development in South America were brought out. The chairman, in submitting his report, said that it "dealt with a period for the most part anterior to the great improvement resulting from the bountiful harvest with which the company has been favored. In continuing, he said: "The company had progressed throughout, and the increased prosperity of Argentina must undoubtedly still further improve the prospects of the company. Unusual expenditure for maintenance and renewals was occasioned in the early part of the year by the removal of their chief central exchange from the location it had occupied for more than twenty years in Calle San Martin to their building in the Avenida de Mayo, and during the latter months by storms of extraordinary severity in the province of Buenos Ayres, which seriously damaged some of their most important lines in many directions. The company's underground plant, established and being extended in Buenos Ayres and commenced elsewhere, would remedy to a considerable extent the risks from these severe storms, but their pole lines must always be subject to possible injury from this source. The present position of the company was better and stronger than it had ever been. They now covered to a great extent the city and province of Buenos Ayres, the richest and most populous district in South America, and they also occupied the two most populous cities in Argentina outside this district—Rossario and Cordoba. They might, therefore, confidently look forward to a reliable future for the company's business and to its increasing importance."

Conditions in Chili

THE report of the directors of the Chili Telephone Company for the past fiscal year states that the aggregate number of subscribers at all centers at the end of the year was 5,371, as compared with 4,981 at the beginning, or a gain of 390 for the year, says the *London Electrical Engineer*. The gross revenue in Chili from all sources was $841,193, as compared with $759,139 the previous year, an increase of $82,054. The expenditure in Chili was $401,519, as compared with $365,776, an increase of $35,743. The net income in Chili from all sources was $439,674, as compared with $393,362 in 1901-2, an increase of $46,312. The average rate of exchange for the year was 15.68d., as compared with 14.85d. in the previous year, giving an increase for the year of $0.83. The directors recommended the payment of a dividend on 6s. per share, less income tax, being at the rate of 6 per cent. per annum, absorbing £12,375, and leaving a balance of £2,637 to be carried forward. The total mileage was on March 31, 1903, 9,205 miles 892 yards; on March 31, 1902, 8,754 miles 527 yards—an increase of 451 miles 365 yards.

The National Companies Report

THE report of the directors of the National Telephone Company for the half-year ending June, 1903, which was submitted to the meeting recently held at Hamilton House, Victoria Embankment, E. C., says: "The income accrued in respect of the business of the half-year amounts to £894,046 15s. 4d. as compared with £823,243 4s. 3d. for the corresponding period of 1902, being an increase of £70,803 11s. 1d. The working expenses for the half-year amount to £516,052 0s. 7d., as compared with £478,031 16s. 10d. for the corresponding period of 1902, being an increase of £38,020 3s. 9d. The net result for the half-year (after deducting the post office royalties, amounting to £81,930 8s.) is a profit balance of £296,064 6s. 9d., as compared with £269,445 8s. 3d. for the corresponding period of 1902, being an increase of £26,618 18s. 6d. The rentals carried forward for unexpired terms of running contracts amount to £874,383 1s. 10d., as compared with £821,397 12s. 8d. at the corresponding period of 1902, being an increase of £52,985 9s. 2d. Out of the available balance of £239,748 5s. 2d. shown by the net revenue account (No. 3) the board recommend the payment for the half-year of a dividend at the rate of 6 per cent. per annum on the first and second preference shares, 5 per cent. per annum on the third preference shares, 6 per cent. per annum on the preferred stock, and 5 per cent. per annum on the deferred stock, less income-tax in all cases. The board also proposes to transfer £85,000 to the reserve fund, and to carry forward the balance of £5,831 11s. 10d. The sum of £334,115 19s. 11d. has been expended on capital account during the half-year in the erection of 14,606 additional exchange and private stations and in underground construction.

The Telephone in the Courts

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law.
They will be answered and explained by Mr. McMillan on this page.

CITY CANNOT FIX RATES.

THE city of Ottumwa, Ia., has been unsuccessful in its attempt to prevent by injunction the Ottumwa Telephone Company from raising its rates in connection with the improvement of its service. The plaintiff sought to enjoin the company from increasing its rates beyond two dollars per month to business houses and one dollar to dwellings, upon the ground that such increase was prohibited by the terms of the ordinance by which its franchise was granted. After a hearing in the district court of Wapello County, the defendant's demurrer to the petition of the city was sustained by the district judge and the plaintiff given until the first day of next term to amend or elect to stand upon the petition. The judge filed a written opinion in the case. It was not claimed by the plaintiff that the city was given the power to regulate the rate of charges to private customers at the time the ordinance was enacted or by any subsequent act of the Legislature. The plaintiff claimed that in the petition to the Council for the ordinance the defendant stated that at no time in the future would the company demand or receive for services a greater rate than that mentioned and that by reason of such statements the City Council was induced to and did pass the ordinance in question. The Council, however, for some reason did not make this petition in any way a part of the ordinance in question by any reference thereto. The ordinance provided as follows:

"This ordinance is in the nature of a contract, and shall be in force from the filing of an acceptance of the same by the said company with the City Clerk."

The judge in his opinion said that if the petition was a proposition to the city, and the city had by ordinance accepted it, then it would be part of the contract, but, the city instead of so doing made a proposition to the company by the ordinance enacted, and gave the defendant sixty days in which to accept. It was fair to presume, continued the Court, that the city recognized the fact that it had no right to control the rates to private individuals, and did not so undertake to do by ordinance, but made the very best terms it could for its own use of the defendant's telephones and was content therewith. The only provision of the ordinance that was relied upon by the plaintiff to prevent the raising of rates was a section by which the city reserved the right to require the company to place its wires under ground and to direct the material of which the company's poles should consist, saying that "the charges for such service shall not exceed those contracted for by said company at the time of the adoption of this ordinance." In answer to this contention the judge said that it was not alleged that the city had ordered the defendant to place its wires under ground, but that it had permitted the defendant to do so. The words "such service" the Court held to refer to "service" previously mentioned in the ordinance, and not to matters contained in the petition. The Court refused to indulge any presumption that the city was seeking to exercise any powers not conferred by statute.

INJUNCTION DENIED.

THE injunction case of the town of Fort William against the Bell Telephone Company was recently heard at Port Arthur, Ont. The injunction was not granted, and the bill of complaint dismissed. It was ordered that the plaintiff should not bring action or take any proceedings to interfere with the erection of poles or the stringing of wires by the defendants in the town until judgment should be pronounced by the final appellate court, to which the action of the Corporation of the city of Toronto against the Bell Telephone Company of Canada, Limited, now pending, may be carried, or until such action may be otherwise disposed of. The court ordered that the plaintiff pay the defendant one dollar damage for loss sustained by reason of the injunction orders granted, including costs.

YORK STATE APPEALS INJUNCTION CASES.

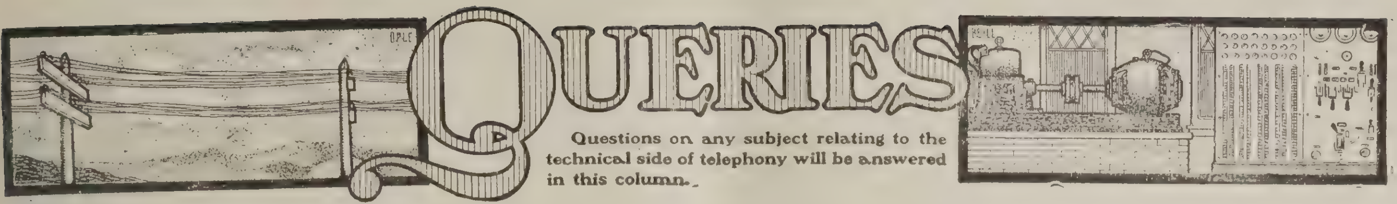
THE York State Telephone Company will appeal the injunction cases recently decided against it by Justice Forbes of the New York Supreme Court. Justice Forbes, in his findings of fact, found that the plaintiff in the case of William A. Gray owned the highway in front of his premises, that the defendant company dug fourteen holes thereon for the erection of poles and the stringing of wires; that no proceedings had first been taken to compensate the owner for the land; that "the construction, maintenance and operation of the line would have been a continuous trespass." In his opinion the Justice used the following decided language: "It was, in my judgment, a serious breach of the peace, and had the entry, as made upon the plaintiff's title, been met by equally unlawful means, the consequences might have been very grave indeed, and it will not do to encourage the doctrine sought to be established by the defendants or to hold that a man's rights may be invaded with the expectation that he will hold his peace, or that he will not himself resort to force, as he might do, to either cut down or destroy the poles and lines placed upon his premises, or beat or bruise the trespassers, ejecting them from his lines by force."

COMPELS INSTALLING OF TELEPHONE.

AN action has been begun in the district court at Topeka, Kan., by F. V. Crouch to compel the Iola Telephone Company to install and maintain a telephone in his residence. The company moved the one there and refused to put it back. The plaintiff claims that the company is a public servant, and as such is compelled to serve the public. A writ of mandamus is asked for to compel the giving of service. The company's contention is that they had and maintained a telephone in the Crouch residence which he failed to pay rental for. Their rule was that the service must be paid for three months in advance. It was upon the plaintiff's failure to pay his bill that the instrument was removed. Afterwards, it is alleged, he paid up and tendered a year's rental in advance, but they refused the money, and declined to put in the telephone.

FOOT CUT BY BROKEN INSULATOR GLASS.

ALLIE S. WILHOYTE, of Louisville, Ky., has begun suit against the Cumberland Telephone and Telegraph Company for $1,950. He alleges that he stepped on a piece of insulator glass, thrown in the road by defendant's employees, cutting his foot and causing serious injury.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

EXTENSION TELEPHONE CIRCUIT.—(164.)

We have two telephones connected to the same line which runs into a common battery exchange. We want if possible to arrange it so that all calls will be received on one telephone, and if necessary the other telephone can be called from the receiving telephone. We want it also fixed so that either telephone can call the other and carry on conversation without calling the central operator, and so that either telephone can call the central operator. Can you give us such a wiring diagram? H. O. H.

Such a circuit was given in the issue of The American Telephone Journal for June 27, 1903, in an article, "Some Methods of Connecting Extension Instruments," by A. Dallam O'Brien. Fig. 164 shows the circuit. Mr. O'Brien describes the circuit as follows:

"Each instrument is provided with a switching key, as shown, The line wires from the central office are connected to the long spring of the key at the main instrument and to the outer springs of the key at the extension. The normal or inner contacts of the switching key at the main instrument are wired in series with a condenser and bell, as shown, thus bridging the condenser and bell across the central office line when the key is in its normal position, and in this way allowing the central office operator to signal the station.

"The outer contacts of the key are connected to the line terminals of the instrument, so that when the key is thrown and the long springs and outer contacts brought together, the instrument is bridged across the central office line so that the removal of the receiver from the hook closes the line circuit and signals the central office. At the extension instrument the long springs of the switching key are connected to the line terminals of the instrument and from the normal contacts of the key a pair of wires is run to the line terminals of the main instrument, a battery being included in the circuit of one of them, as shown in the figure. When the extension instrument wishes to signal the central office, the switching key is thrown, bringing the long springs and outer contacts together and thus bridging the instrument across the line, so that the removal of the receiver from the hook signals the central office operator. Both instruments are provided with hand generators and bells, and when one station requires to call the other the signal is given by means of the generator which sends current over the line to the switching key, thence through the bell at the required station and back through the switching key to the calling instrument. When one station signals another it is necessary for the ringing current to pass through the battery which is located in one side of the line between the two instruments. This, however, will not affect the ringing, as the battery is of low internal resistance; neither will it in any way affect the battery.

"The called station having answered and the telephones being removed from the hook at both stations, battery flows through the two instruments in series, and conversation is carried on in the usual way. Where the distance between the main and extension station is not great, two cells of any good wet or dry battery will answer for talking purposes. The ringing generators at the stations should be provided with an automatic device for opening their circuit when not in use. The bells should be equipped with condensers. There is no reason why the ordinary common battery instrument, using an induction coil, cannot be used."

GORDON CELL REVERSES POLARITY—(165.)

Will you answer the following through the columns of the Journal: What is the cause of a Gordon cell reversing its polarity when exhausted: We have had it happen several times that our transmitter battery would show up weak very suddenly, and when we would put the voltmeter on the different cells we would discover one with its poles reversed, which would stay that way for perhaps 12 hours after being disconnected from the rest and then gradually return to normal and be entirely exhausted. While reversed the cell shows a voltage nearly as high as a new cell should. We can only account for it on the supposition that it is the nature of a storage cell action. F. M. B.

You were right in your supposition. Several forms of so-called dry cells are so composed as to be reversible. When an outside source of E. M. F. is applied to them; their chemical constituents are converted to the original form and the battery is literally made over. This process may be repeated a number of times.

DIRECTIONS FOR SETTING UP FULLER CELL.—(166.)

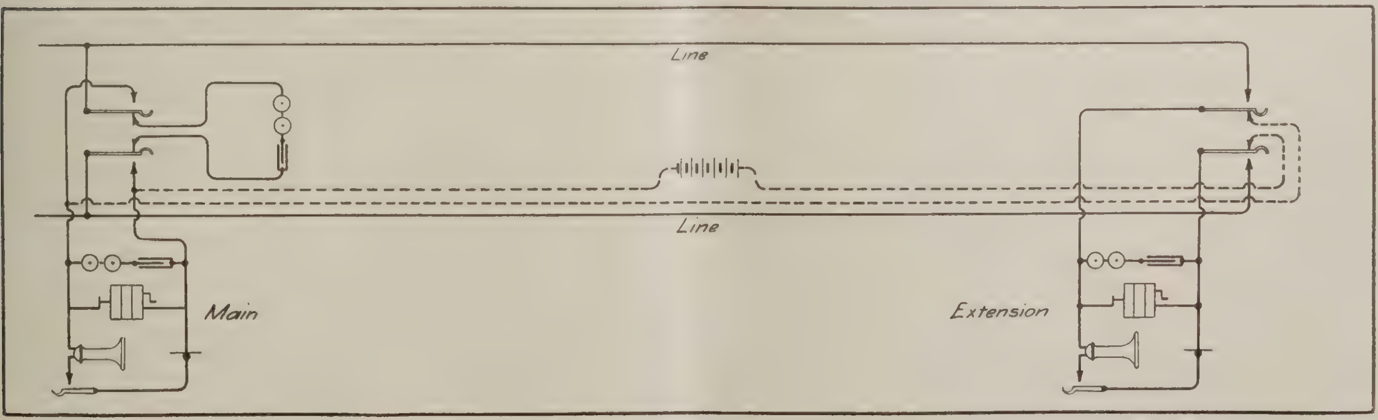
Can you give me directions for setting up a Fuller cell and a receipt for the chemical liquid that I should use in it. C. R. S.

The electrolyte for a Fuller is composed of the following:

Sodium bichromate	6 oz.
Sulphuric acid	17 oz.
Soft water	56 oz.

First dissolve the sodium bichromate in the water and then add slowly the sulphuric acid. (Never pour water into sulphuric acid.) The mixture should be made in an earthen vessel. If a glass jar is used it should be surrounded by water to prevent overheating. Bichromate of potash may be used instead of bichromate of sodium. The cell is set up as follows: Place the quantity of solution made by the above formula in the glass jar. Put one teaspoonful of mercury in the bottom of the porous cup, add two teaspoonfuls of common salt, place the zinc in the bottom of the cup and fill to within two inches of the top with soft water. Place the porous cup in the jar and put on the cover, and pass the wire from the zinc through the hole provided for it.

Fig. 164—Extension Telephone Circuit.



ELECTRICAL MEASUREMENTS—ARTICLE XVII.

TESTING OF AERIAL LINES.

By Arthur Vaughan Abbott.

A TROUBLESOME portion of every telephone plant is the open wire construction, which is continually getting out of order; lines are breaking, owing to numberless causes, and those which do not part frequently become grounded, and consequently the repair gang is continuously at work clearing troubles of various kinds. To see that the work is properly and faithfully done, every wire chief should look up every case of trouble which is cleared and ascertain by inspection that previous faults are not only thoroughly and adequately removed, but that no new troubles are introduced.

The two tests which are most frequently applied are those for conductivity and insulation.

Insulation.—The first test to be applied to an open wire line is to measure its insulation resistance. Tests of this kind should be performed only in reasonably dry weather, preferably shortly after a rain storm, which has washed the insulators clean from dust and dirt, but sufficient time should have elapsed in order that the insulators may become thoroughly dried. One end of the wire to be measured is attached to the binding post, *D*, see Fig. 1, while the binding post *C* is grounded. The resistance between the wire and the earth is then measured by the bridge in exactly the same manner as has already been described for the measurement of any resistance with the Wheatstone bridge. No wire chief should be satisfied unless his aerial lines measure at least 1 megohm per mile, and first class construction should measure several megohms per mile. The capacity of the bridges described runs as high as 21 megohms, but the full capacity can only be secured by the use of a more powerful battery, and a more sensitive galvanometer than is generally supplied with the testing set. The actual insulation resistance will vary with the length of the line to be tested, for if a line has an insulation resistance of 10 megohms per mile and the line is two miles long, the actual resistance will be 5 megohms, whereas if it is half a mile long the resistance will be 20 megohms; so assuming the full capacity of the bridge to be available and a standard of 1 megohm per mile to be maintained the wire chief can satisfactorily test a line as short as 1-20 of a mile; or, in other words, about 250 feet.

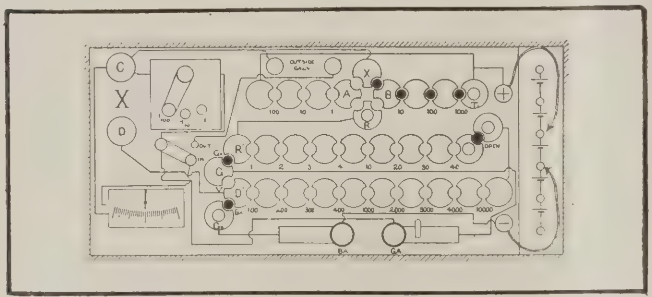


Fig. 1—"Lay Out" for Constant—Direct Deflection Method.

There will be few cases where the aerial line to be measured will not be much longer than this. It is possible to use the method of direct deflections with the galvanometer furnished in the portable testing set. To do this the first thing is to ascertain the constant of the Galvanometer, namely, the number of divisions which it will deflect for a given E.M.F. through a known resistance. To determine the constant arrange the face in the testing set as shown in Fig. 1, that is to say, include one cell of battery in the terminals to the bridge, place the plugs as shown in the figure, and set the shunt switch upon 1-100 in order to reduce the sensibility of the galvanometer; then adjust the rheostat until any convenient deflection is obtained on the galvanometer. Let us suppose under these circumstances that the galvanometer shows 10 divisions when the plugs in the rheostat show 2,000 ohms; hence, 1 volt will show a deflection of 1 division on the galvanometer *unshunted* through 2,000,000 ohms (2,000 x 10 x 100), or in other words the constant of the galvanometer is 2 megohms. Therefore, any unknown resistance may be at once estimated by reading the deflections produced on the galvanometer and the E.M.F. employed.

Suppose now we wish to test the insulation resistance of a cable or of an aerial line. Connect up the testing set as shown in Fig. 2, in which the cable conductors are connected to the post *D* and a ground connected to the post *GR*. Suppose that all of the 5 cells of the battery be introduced and that under these circumstances the deflection of the galvanometer unshunted is 5 divisions, we know that one cell of battery will give one division through two megohms, hence 5 cells of battery will give 1 division through 10 megohms, as the galvanometer reads 5 divisions, the actual insulation is 10 megohms divided by 5, or 2 megohms. Where measurements are to be made of a cable or other conductor, whose insulation is supposed to be very high, it is desirable to use a more powerful battery than is supplied with the testing set, and for this purpose, if available, there is nothing better than the 110-volt ordinary Edison direct current circuit. If there is no electric lighting circuit a number of dry cells will answer the purpose admirably. In making insulation tests all normal grounds must, of course, be removed; that is to say, if the telephone circuits are arranged to allow the subscriber to ring ground and talk metallic the hook switch must be lifted during testing, for the object of this measurement is to determine the *constructive* insulation of the circuit.

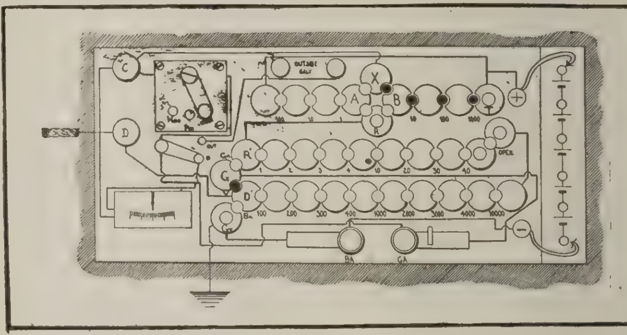


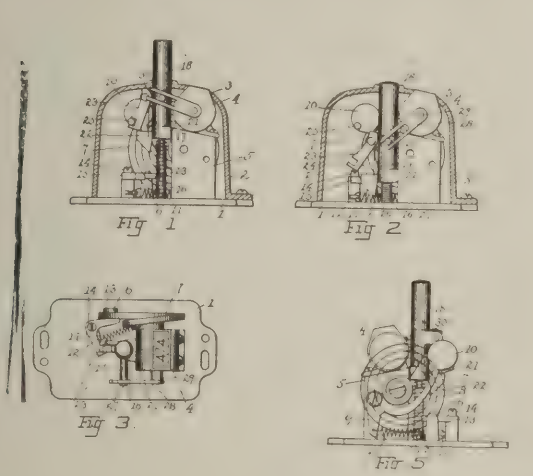
Fig. 2—Insulation by Direct Deflection Method—Actual "Lay Out."

Conductivity Tests.—The conductivity test is important in ascertaining whether there are any bad joints or other places in the line which introduce excessive resistance. If a line to be measured is a complete metallic circuit it is tested by inserting the two ends of the line into the binding posts *C* and *D*, Fig. 2, and measuring the resistance of the loop formed by the two sides of the line by means of the rheostat in the bridge in exactly the same manner as has already been described in the measurement of any ordinary resistance. In making this measurement it is essential that all resistances which are foreign to the circuit, such as telephone receivers, transmitters, ringers, etc., should be excluded, and this is conveniently arranged by short circuiting, for the time being, the subscriber's instrument at its binding posts. If the size of the wire composing the line be known and its resistance be measured, one can at once tell whether the line is properly constructed or whether bad joints or other imperfect places exist. To do this, however, it is essential to know the length of the line which is being measured. For example, suppose an aerial line to be constructed of No. 12 B. & S. copper wire. Suppose the loop to measure 3½ ohms and that the loop is 1,000 feet long from the point of testing. The resistance of No. 12 copper wire is 1.589 ohms at 75 deg. F. per 1,000 feet; 2,000 feet would therefore have a resistance of 3.178 ohms and the loop shows a resistance of 110 per cent. This is 10 per cent. more than the loop theoretically should measure, which is not an excessive allowance for the extra resistance due to sag in the spans, the resistance of joints, error in ascertaining the exact length of the line and that due to the drop wires and other connections. If, on the contrary, a resistance of 4 ohms had been found, showing an increase of 27½ per cent. over the calculated resistance, a suspicion of bad connections would be raised and the line should be examined and corrected.

PATENTS ISSUED

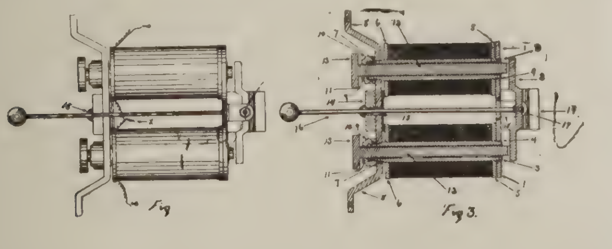
TELEPHONE TOLL INDICATOR.

George A. Long, of Hartford, Conn., patents (No. 733,494) a telephone toll indicator, and assigns his invention to the Gray Telephone Pay Station Company, of Hartford, Conn. The object of this invention is to provide an indicator capable of attachment to the telephone which shall be adapted to register the calls made from the instrument, and at the same time inform the central office operator that the call has been registered by the subscriber. Fig. 1 shows a side elevation of the device with posts in normal positions. Fig. 2 shows the same view after the depression of the plunger. Fig. 5 shows a side elevation opposite to that shown in Figs. 1 and 2. The device is operated by depressing the plunger *18*, which releases the hammer *10*, which striking spring gong *7* conveys a signal to the operator; at the same time, by means of the pin *27*, the ratchet mechanism of the register *4* is operated and the call recorded. A muffler *13* serves to muffle the gong until the plunger has been depressed, thus making it impossible to sound the signal by striking the box.



TELEPHONE RINGING DEVICE.

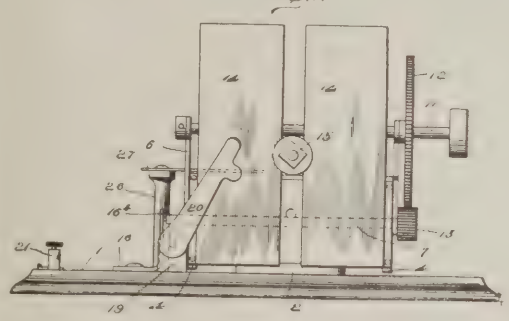
James I. Gemmill, of Cleveland, Ohio, patents (No. 732,730) a telephone ringing device. The object of this invention is to provide for the adjustment between the armature and the cores of the electromagnets without changing the relative position of the armature to the permanent magnet. Fig. 2 shows a top view of the ringer and Fig. 3 a section. The cores *3-3* are drilled centrally from end to end, the caps *10-10* are drilled and tapped to receive the threaded portion of the core screws *12-12* which pass through the cores *3-3* and extend in front to a point close to the armature. The screws are adjusted by means of the round thumb pieces *13-13*. The permanent magnet *14* is attached to the base in the usual manner by a screw at *15*. The striker wire and hammer are riveted to the armature.



MAGNETO ELECTRIC MACHINE.

Daniel Drawbaugh, of Eberly's Mill, Pa., patents (No. 733,948) a magneto electric machine. The object of this invention is to provide a machine which can be substituted for a Ruhmkorff coil and batteries. Fig. 1 shows a side elevation of the machine, Fig. 3 a plan and Fig. 4 a transverse section. The machine is adapted to be used in conection with wireless telegraphy and telephony. The shaft *11* is intended to be revolved at a high speed by some external source of power, thus driving the armature by means of the gearing, shown in the figure, and generating current of high potential. In order that the machine may be short-circuited and the desired effect attained, the switch *23* is employed and the short circuit and necessary break obtained through plate *18*, wire *24*, posts *25* and *26*, spring plate *27* and plate *10*, which is carried on the armature, and which engages with *27* during a part of the revolution of the armature, as will be seen in Fig. 4.

Fig. 1.



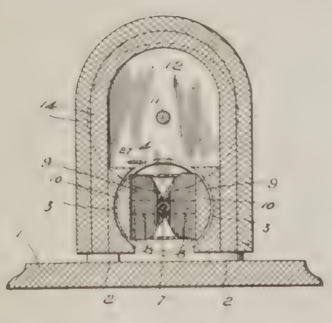
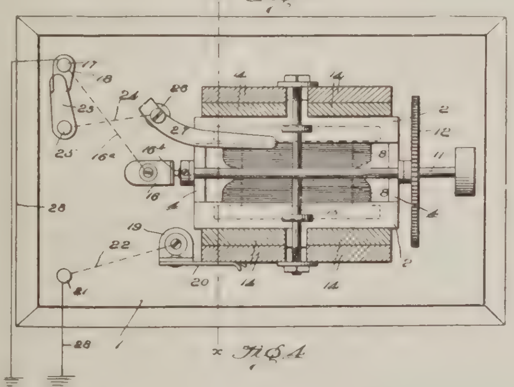


Fig. 3.



SAD, BUT UNFORTUNATELY TRUE.

A YOUNGSTOWN (Ohio) telephone operator has lost her voice, says an exchange. Sometimes it takes operators in other places several minutes to find theirs, or, at least, get them into shape so that they can say "What number?"

The Week's Messages.

FINANCIAL

INDIANAPOLIS, IND.—The new telephone company has declared its regular quarterly dividend of 1½ per cent. The company, which was organized in January, 1898, is capitalized at $400,000 with a bonded debt of $800,000. The officers are: President, A. H. Nordyke; vice-president and general manager, S. P. Sheerin; secretary, H. B. Gates; assistant secretary and treasurer, H. B. Sale.

ST. PAUL, MINN.—The directors of the Twin City Telephone Company have declared a regular quarterly dividend at the rate of seven per cent. per annum.

KINGSTON, N. Y.—The directors of the Citizens' Standard Telephone Company have declared a dividend of one and one-half per cent., payable in August.

BELMONT, OHIO.—The People's Telephone Company, of Belmont, has increased its capital stock from $1,000 to $2,000.

JACOBSBURG, OHIO.—The People's Telephone Company, of Jacobsburg, has filed a petition with the Secretary of State, increasing its capital from $1,000 to $2,000.

SPRINGFIELD, OHIO.—The Springfield-Xenia Telephone Company has increased its capital stock from $500,000 to $750,000. Ed. L. Barber, president; C. D. Juvenal, secretary.

FRANCHISES

COLUMBUS, GA.—The Girard city council has granted a franchise to the Columbus Automatic Telephone Company.

TAMORA, NEB.—The People's Mutual Telephone Company, of this city, which was recently organized, is securing franchises for constructing a system in Seward. The capital stock of the company is $100,000, and its rates for service will be $12 yer year. The officers are John R. Lawyer, president; S. R. Anstine, secretary.

BATAVIA, OHIO.—The Citizens' Telephone Company, of Batavia, has asked the Norwood Council for the right to occupy Duck Creek Road with a single line of poles. Vice President W. R. Fee offers to pay Norwood $1 for every pole erected in the city limits. The line is desired to extend the Clermont County independent lines for an entrance to Cincinnati.

ELECTIONS

SAVANNAH, GA.—The third annual meeting of the stockholders of the Georgia Telephone and Telegraph Company was held here recently. The reports of the secretary and treasurer were read, and showed a marked improvement in the year's work over that of the preceding twelve months. The company declared a semi-annual dividend of 3 per cent. The stockholders elected the following directors: W. A. Bisbee, J. H. Estill, Herman Myers, Leopold Adler, H. P. Smart, W. W. Mackall and Jacob Paulsen.

SARATOGA SPRINGS, N. Y.—The Saratoga Telephone and Telegraph Company held its annual meeting at Saratoga Springs. The following were re-elected: President, S. C. Medbery, Ballston Spa; vice-president, Edward Davis, Philadelphia; secretary and treasurer, W. Levis Burk, Troy.

BARRE, VT.—The new officers of the Washington County Telephone Company are: President, Donald Smith; vice-president, D. M. Miles; secretary, B. W. Hooker; treasurer, Frank F. Cave.

PLEASANT PRAIRIE, WIS.—The first meeting of the directors and stockholders of the Pleasant Prairie Telephone Company was held on Saturday evening, at the office of the compay in Pleasant Prairie. The organization of the company was completed by the election of officers as follows: President, Frank Holt; vice-president, Harding Crow; secretary and treasurer, John B. Maloney. The officers, with Frank Stanley and E. A. King, will compose the board of directors of the company. The company is considering plans for the extension of the present exchange of the company.

COMBINATIONS

OAKESDALE, WASH.—Seven rural telephone lines running out of this town are to be consolidated. A carload of poles has arrived for the rural telephone exchange here, and work has already commenced.

NEILLSVILLE, WIS.—The management of the Badger State Telephone Company has passed into the hands of W. B. Smith of this city.

PERSONAL.

P. K. HIGGINS, of Los Angeles, Cal., has accepted the position of Superintendent of Equipment with the Home Telephone Company of that city. Mr. Higgins was formerly a Bell man, having been with the Central Union of Indianapolis, Ind. His many friends will be pleased to learn of his good fortune.

J. R. NANCE has been appointed General Superintendent and Manager of the Home Telephone Company of McComb, Pike County, Miss., with headquarters at McComb City.

CHARLES SQUIRES has been selected as Superintendent of Construction of the Mexico Telephone Company, Mexico, Mo.

OBITUARY.

PHILADELPHIA, PA.—Thomas B. Hartman, until recently superintendent of the United Telephone Company's service in Lancaster County, died in Lancaster, Pa., from injuries received in a fall.

UNDERGROUND

DANVILLE, ILL.—An underground system is being installed within the fire limits by the Vermilion County Telephone Company. There are 90,000 feet of conduit and six miles of trench work. The improvement is being made at an expenditure of $50,000.

CHESTER, PA.—The United Telephone and Telegraph Company, of this city, has decided to put its wires underground.

DENTON, TEX.—The Independent Telephone Company has begun putting in its conduits for the underground telephone system in opposition to the Southwestern.

EL PASO, TEX.—An ordinance has been framed in council to revoke the present franchise of the Southwestern Telephone Company, and substituting therefor another franchise of twenty-five years, with the proviso for underground wiring within the inner fire limits.

MISCELLANEOUS

PHILADELPHIA, PA.—The board of directors of the Keystone Telephone Company have passed resolutions of regret upon the death of Robert H. Foerderer, who, until his death, was president of the corporation. The board will attend Mr. Foerderer's funeral in a body.

LITTLE FALLS, N. Y.—A central energy switchboard is replacing the one that was recently destroyed by fire. The board now contains 820 lines and has an ultimate capacity of 2,000. Service will be given in one week. The Bell Company recently secured a franchise in Little Falls, and is making efforts to secure contracts, but on account of the high rates they have not been successful. It was necessary for the Bell to give all city telephones free of cost in order to get the franchise.

CARDINGTON, OHIO.—The Morrow County Telephone Company is making extensive improvements at the Cardington exchange.

CLEVELAND, OHIO.—Claude Ashbrook, of Cincinnati, has bought the entire $500,000 issue of United States Telephone preferred stock. The money will be used to extend the lines of the company through the southern part of the State. They will ultimately reach and enter Cincinnati. The stock was sold at 80.

NEWARK, OHIO.—The directors of the Newark Independent Telephone Company have decided to build country lines, enlarge and improve the telephone exchange at Granville, to install an additional toll board to accommodate the patrons who use the long distance lines and to enlarge the local plant, which has grown from 650 to 1,100 subscribers within the past four months. The directors also ordered the payment of a 1 per cent. quarterly dividend on the common stock.

New Construction in the Field

BROCKVILLE, ONT., CAN.—A composite telephone and telegraph system has been established over the wires of the Grand Trunk Railway, connecting Montreal, Coteau and Cornwall. The work was carried on under the direction of General Lardmaster Donaldson.

ORANGE, CONN.—The Orange Telephone Company has extended its lines to Woodbridge.

CUTHBERT, GA.—F. H. Davis, owner of the long distance telephone exchanges in Cuthbert and Shellman, and five long distance lines from Cuthbert, has purchased the exchanges in Lumpkin and Richland. He will build a long distance line between Cuthbert and Lumpkin.

AURORA, ILL.—The Interstate Telephone Company has completed toll lines to Sterlihg, Morrison and points in Whiteside County through to Clinton, Iowa.

BLOOMINGTON, ILL.—The Home Telephone Company is planning to install over 20,000 feet of cable.

FLORA, ILL.—The rural telephone line extending southeast to Flora and covering portions of Clay and Wayne counties, has been opened for business. The line which was built expressly for the farming communities will be followed by the construction of other lines, with Flora as the center of the system.

LEXINGTON, ILL.—The Prairie Hall Telephone Company will construct a local system.

GASTON, IND.—The Delaware and Madison Telephone Company has a gang of men at work building a line from Shideler to this place. The Gaston Telephone Company will connect with this line.

GRANT, IA.—The Rural Telephone Company is building a branch line north of town.

KEOKUK, IA.—As soon as the Mississippi Valley Telephone Company can secure material needed, it will establish a connection with the Lakeside Mutual Telephone Company.

CHASE, KAS.—C. Orr, of Chase, and J. W. Layton, are prospecting for a telephone system here.

LYNDON, KAS.—The farmers living north of town contemplate building a rural telephone system.

MAYSVILLE, KY.—The Mutual Telephone Company has decided to build the new line to Dover from Fernleaf instead of Tuckahoe.

GLENVILLE, MINN.—The Glenville Telephone Company is extending a line to Hayward.

MINNEAPOLIS, MINN.—The Twin City Telephone Company is securing right of way for the long distance line between Minneapolis and Grand Fork, N. D.

WINONA, MINN.—The Winona Telephone Company will extend a line to Mount Vernon and Houston.

JEFFERSON CITY, MO.—Manager McHenry, of the Capital Telephone Company announces that the new line to St. Thomas is ready for service, and that the Columbia line is also in good working order.

GREAT FALLS, MONT.—The Benton and Highwood telephone line, in which a number of Great Falls citizens are the principal stockholders, has been completed. Cyril Goscline had the contract for stringing of wire.

MANCHESTER, N. H.—The management of the Citizens' Telephone Company is planning to establish a central exchange at Tilton.

LEBANON, N. J.—An effort is being made to have the Lebanon Telephone Company run its line from Whitehouse Station to East Whitehouse.

ROSWELL, N. M.—The Roswell Telephone Company will spend $5,000 in the near future in improving its system.

COOPERSTOWN, N. Y.—The necessary stock has been subscribed for a telephone line from the Cooperstown Independent exchange to Five Mile Point.

ELMIRA, N. Y.—The York State Telephone Company has long distance connections and toll service to Waverly, Sayre, Athens and Towanda, and all intermediate points on the south; Horseheads, Montour Falls and Watkins on the north; Breesport, Erin, Van Etten and Spencer on the east; Corning, Addison, Canisteo, Hornellsville, Wellsville, Olean, Salamanca, Jamestown, Chautauqua, Mayville, Fredonia, Dunkirk and all intermediate points on the west; Bath and all intermediate points to Corning; Lawrenceville and other points in northern Pennsylvania; Gibson's Landing on Lake Keuka, and intermediate points, and are continuing to extend their long distance service.

ITHACA, N. Y.—The Ithaca Telephone Company has completed the line to Groton, Locke, Moravia, Ludlowville and North Lansing.

BRILLIANT, OHIO.—Everything is in readiness to string the cable of the Wellsburg Home Company across the river, to land on Windy Point, and the 30 subscribers of the company expect to be connected up with the Wellsburg exchange and the Steubenville-Phoenix lines soon. A second home company, in which C. I. Waddle, Samuel McCune, Robert Carpenter, James G. Gilchrist and others are interested, has made an application for a charter under the laws of West Virginia. This company proposes to build a telephone line from Steubenville to Martin's Ferry on the Ohio side by the shortest possible route. At Martin's Ferry their lines will connect with the Independent company of Wheeling, and at Portland Station with the lines of the Smithfield, Dillonvale and Adena company.

KENTON, OHIO.—The Kenton Telephone Company is contemplating improvements to exceed $8,000. Lines will probably be run through the northern part of Logan County.

BEDFORD, PA.—The Bedford-Fulton Telephone Company has completed its new line from Everett to Ray's Hill and Breezewood. The company has started to put up wires on the line to Gapsville and Crystal Springs.

LATROBE, PA.—The Federal Telephone Company is preparing for extensive improvements in the local service.

MT. CARMEL, PA.—The lines of the United Telephone and Telegraph Company passing through this place and the local exchange are to be very materially improved and the latest improved apparatus installed at all points served by the company.

WASHINGTON, PA.—The Federal Telephone Company is building a line from Washington to Wheeling, about 35 miles.

NEWBURY CENTRE, VT.—The Newbury Centre Telephone Company has finished installing the line from the Centre to West Newbury, which makes a metallic circuit through to Bradford.

LA CROSSE, WIS.—The La Crosse County Telephone Company, which has its headquarters in this city, is making some extensive improvements, and also extending the line throughout the county. Mr. Charles H. Schweizer, one of the officers of the company, said that it was the intention of the company to install between 500 and 1,000 farmers' telephones. A line has recently been extended to Pond's Camp No. 1. Another line has been constructed to Steenson's mill, near West Salem, and another to Grand Dad bluff. These lines also connect farmers with the line.

WILLONDALE, WIS.—A new farmers' telephone line has been recently constructd to Willowdale by the Rock County Farmers' Telephone Company.

HAGERSTOWN, MD.—The Dry Run Telephone Company will build a line from Clearspring to Big Pool and make other extensions during the summer.

GRAND RAPIDS, MICH.—The Citizens' Telephone Company has completed its line to Dighton by way of Tustin, where an exchange of thirty-one telephones is being put in. This line is connected with the State line at Cadillac.

HAVRE, MONT.—The Havre Electric Light & Telephone Company has started business, but the linemen are still at work and it will still be a few days before all the private and business houses have the service.

EDGAR, NEB.—The lines of the Edgar Telephone Company are being extended into the country for the farmers. It is also the purpose of the company to extend the lines to surrounding towns and to some of the nearest county seats.

WEST HOPKINTON, N. H.—The West Hopkinton Telephone Company has its line completed and in operation.

BINGHAMTON, N. Y.—The Independent Telephone Company will construct a line to Port Dickinson.

CORFU, N. Y.—The Darien Rural Telephone Company has its poles set from Darien City to within a mile of Corfu.

RALEIGH, N. C.—The Interstate Telephone Company has completed its line to Leesville.

WARREN, O.—The Jefferson & Warren Telephone Company has made some needed improvements on its lines in Jefferson.

PITTSBURGH, PA.—The Hazelwood and West End districts, which have been clamoring for a competitive telephone line for many months, are about to be satisfied. The P. & A. Company now has about 500 orders to fill in these two districts, with indications that this will be greatly increased in a short time.

ALDERSON, PA.—The People's Telephone Company of Wyoming County may extend its line to this place.

SCRANTON, PA.—The Anthracite Telephone Company will extend its line from Clifford through Royal and as far as Lenoxville.

DENISON, TEX.—Progress is being made on the new lines of the La Cross County Telephone Company, and according to the statement of Attorney Charles Schweizer, one of the officers of the company, from 500 to 1,000 new telephones will be installed the coming year. New lines have already been run to Pond's camp No. 1, to Grandad bluff, and to Stenson's mill, near West Salem.

TRADE NOTES

The Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., and Chicago, Ill., has recently sold a 300-capacity switchboard together with telephones and a complete equipment to the Rushville Telephone Company of Rushville, Ill.

The Swedish-American Telephone Company, of 88-90-92 West Jackson Boulevard, Chicago, has recently completed a 2,000-line capacity full central energy exchange at Pittsburg, Kan. They report that their orders for this class of apparatus show a marked increase. Full particulars and descriptive matter will be furnished to those interested.

The Eureka Electric Company, of Chicago and Genoa, Ill., has issued a bulletin—No. 20—in which are described some of the types of telephones that this company manufactures. This company is sole agent for Hinds' Telephone Lease Record, which is said to be a most satisfactory means of keeping track of telephone rentals. All correspondence to this company should be addressed to Genoa, Ill.

The Baird Manufacturing Company of Chicago has disclosed an interesting fact in connection with the pay-station industry of the United States, viz.: that of one type of the company's product (the No. 4 triplet) there are now over 25,000 in use by telephone companies in the United States and Canada. That "pay-stations pay" is no longer disputed, and they pay in any exchange from the smallest to the largest. It is in order for all telephone men to "get in line."

The Stromberg-Carlson Telephone Manufacturing Company are installing a 200-line capacity generator call visual switchboard in the exchange of the Oceana County Telephone Company at Hart, Mich.; also the company is installing a generator call visual switchboard, with a capacity of 140 lines, at Fremont, Mich. This company is installing intercommunicating systems for the following Chicago firms: The Brunswick Balke-Collender Company, the Library Bureau and the Brown & Sharp Manufacturing Company.

The W. G. Nagel Electric Company of Toledo, Ohio, has sent us a little folder describing their "Ready" pay-out reels. These reels are made entirely of iron, with interchangeable parts and cone bearings. Some of the styles manufactured have tension attachments which prevent wire from paying out too readily. These are recommended for telephone work. Reels Nos. 7 and 8 are especially adapted for toll line or drop work, as they can be used in ordinary wagon beds. The "Ready" pole seat made by this company is having a large sale. They are made of steel, painted, and are strong and durable. The weight is 40 pounds and the cost is $3.

The F. Bissell Company are placing on the market a new design in cable cars which provides a table on which an electrician may lay his tools and material while making a splice. It has been highly praised by all who have seen it. The car consists of one continuous piece of pipe without joints except where a short end of pipe is attached at the trolley. The trolleys are of malleable iron, are very light and unbreakable yet very strong. The seat is of wood, dovetailed together to prevent warping, and can be adjusted up or down or to the right or left to suit the size and convenience of the workman using it. The old price was $10, but the table has been added without any addition to price. The whole outfit is now selling for $10. The new price on the car without the table is $7.50. These tables can also be attached to cars of this make already in use.

The Vought-Berger Company of La Crosse, Wis., have recently sold equipments to the following telephone companies: Farmers' Telephone Company, Jessup, Ia.; Farmers' Mutual Telephone Company, Tonkawa, Okla.; Persia Co-operative Telephone Company, Persia, Ia.; Steele County Telephone Company for their Geneva and Ellendale, Minnesota, exchanges; Farmers' and Merchants' Mutual Telephone Company, for their new exchanges at Le Sueur Center and Lexington, Minn.; Stevens County Telephone Company, a 300-drop board for Morris, Minn., and a 100-drop board for their Cyrus exchange; a 100-drop board for the Electric Telephone Company at Stewart, Minn.; Franklyn Telephone Company, Franklyn, Minn.; Barnesville & Wolverton Telephone Company, for their Dibley and Wolverton, Minnesota, exchanges; also boards and telephones for Clutier, Ia.; Sheldon, N. Dak.; Ruthton, Minn.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

TELEPHONE EXCHANGES.—Two first-class telephone exchanges for sale. One 180, the other 200 telephones. Also 20 miles of metallic and 30 miles of grounded toll line. All standard construction and in first-class condition. Net income over $4,000 per year. Price $15,000 cash or good paper. No trades considered. Address UNITED TELEPHONE CO., Malden, Mo.

COUNTRY TELEPHONE SYSTEM in Illinois.—This is a rare chance for the right party, it includes: Franchises, nine exchanges and nearly 100 miles of metallic toll line. Address BOX 62, care The American Telephone Journal, New York.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

SALESMAN—Wanted, experienced telephone and switchboard salesman. One with established Northwestern trade preferred. No applications considered except those giving full particulars. Address BOX 65, The American Telephone Journal, New York.

FOREMAN wanted to take full charge assembling and instrument wiring department in telephone factory in an Eastern city. Must have good experience and be able to comprehend diagrams. Experience in switchboard and central energy equipment desirable, but not positively necessary. Address Box 42A, care The American Telephone Journal, 116 Nassau street, New York.

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau street, New York City.

EXCHANGE WANTED—Would like to purchase a telephone exchange in a good live town; one in the west preferred. Writer would accept a position as manager of an exchange. Address BOX 63, The American Telephone Journal.

POSITION.—Competent telephone man desires position; six years' experience in both inside and outside work. Thoroughly understands common battery and magneto systems. Best of references. Address BOX 60, care The American Telephone Journal, New York.

THE LIBRARY OF CONGRESS desires to secure Volumes 1, 2, 3 and 4 of The American Telephone Journal for its file. Parties who may have these volumes, or parts of them, which they would like to dispose of, please communicate with the LIBRARIAN OF CONGRESS, Washington, D. C.

POSITION.—At liberty after Sept. 1, a competent telephone man. Want position as manager. State salary you can pay and what you want for your money. Address M. L. GAY, Union City, Ind.

GENERAL FOREMAN wanted to take full charge of all departments in telephone factory making complete line of switchboards for both magneto and common battery systems, also complete line of telephone instruments for exchange and intercommunicating systems. Must have good experience in similar position. Location an Eastern city. Address Box 74, care The American Telephone Journal, 116 Nassau street, New York.

DRAUGHTSMAN.—A young man who can make simple drawings and letter well, to do some telephone draughting 3 or 4 evenings a week in New York City; one familiar with circuit drawing preferred, though this is not essential. Address Box 75, The American Telephone Journal, 116 Nassau street, New York City.

The American Telephone Journal

VOLUME VIII *SATURDAY, AUGUST 15, 1903* *NUMBER 7*

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THE TELEPHONE AT THE ST. LOUIS FAIR

By Frank E. Anfenger

Kinloch Private Branch Exchange.

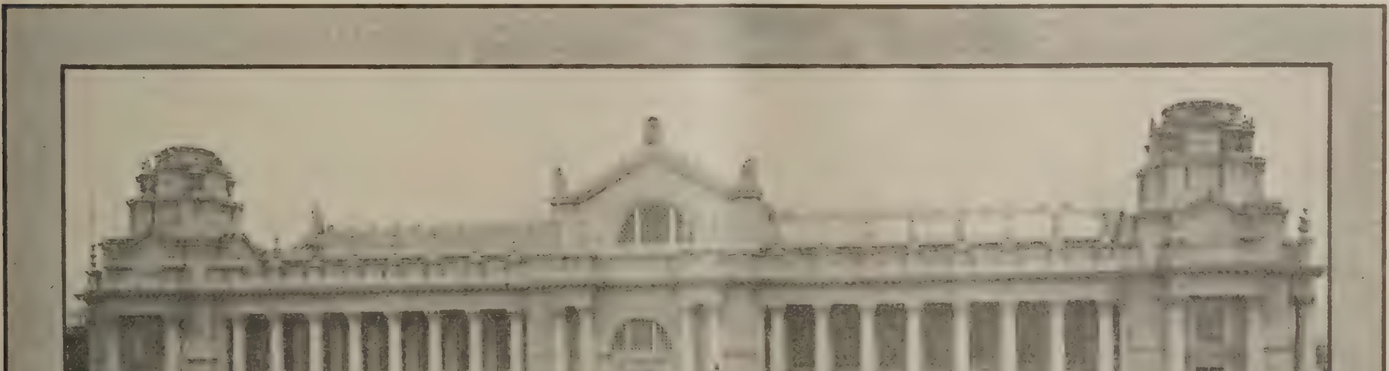
Bell Private Branch Exchange.

IN a quiet corner of the Administration Building, in strong contrast to the busy site and equally active offices that surround them, two young women are playing an important part in the actual construction of the Louisiana Purchase Exposition, in the west end of St. Louis. They are operators in charge of the two private branch exchanges maintained by the two telephone companies of St. Louis, and though they seemingly do nothing but deftly insert and withdraw the plugs in and out of the jacks on the switchboard and watch the little signals, exposition officials and contractors say that their service has proven invaluable and incalculable, in its labor saving in the construction of the exposition. These two private branch exchanges are really the first exhibits to arrive at the Fair site, as they will be the nucleus of large exhibits to be made by both of the telephone companies that operate in St. Louis.

The Administration Building has no intercommunicating telephone system, as the complete service of the two regular companies, makes this unnecessary. Each of the general offices, besides being in quick communication with the many other offices in the building, can reach each of the one hundred and twenty-five contractors who are building the Fair, any of the six gates now in service, the press building and emergency hospital, not to mention every telephone in the city of St. Louis and the thousands of telephones in other cities that can be connected over the toll lines. Later, when all of the gates are put in service, each of them will be equipped with a telephone, as the officials say that these are indispensable for sending quick instructions in case of trouble. Over 125 police boxes of a pattern especially designed for the exposition grounds have been ordered and will be located in convenient places over the 1,240 acres that now embrace the site. These will contain a telephone similar to those used by Metropolitan police departments.

The Kinloch (Independent) Telephone Co. is, as one would naturally expect, the most aggressive and up-to-date. Its private branch exchange now is equipped with a 60-line board and has 10 outgoing trunk lines, and as many more incoming, by means of which the exchange can be reached from telephone stations outside the exposition grounds. The subscribers on the exposition grounds are increasing daily, and the company announces that the switchboard will be, in a short time, supplanted by a larger one, and ultimately moved to the Palace of Electricity, where a model exchange will be in operation. This model exchange will be equipped for 1,000 lines. The Kinloch Company uses a modern lamp signal board, a photograph of which is shown to the left of this page. The Bell Telephone Co. has 39 stations in the site and has 4 incoming and 10 outgoing trunks which terminate on a drop signal board. This exchange will be moved to the Electricity Building during the life of the fair. Service is maintained at both company's boards from 7 A. M. until 10.30 P. M.

The completeness of the system gives the reader some idea of the value of the telephone in building the exposition. If President Francis, of the Exposition Company, is in New York or



This is the eastern elevation taken on July 1, 1903. The building is keystone shaped and is 460 x 520 x 520 x 758 feet.
Palace of Electricity, Louisiana Purchase Exposition.

Washington in connection with the exhibits or appropriations, or the thousand and one details that now occupy him as head of the exposition, he can, in a few moments, communicate with the heads of any of the departments, get any data or information or even confer with his many lieutenants without leaving the eastern hotel corridor.

A story is told which shows how valuable a thing the telephone system is to the contractors and engineers that are now engaged in building the exposition. The chief engineer of one of the contracting companies which is doing a great deal of the construction was called to Pittsburgh in the interests of his company and by mistake took with him a blue print on which was some very essential data, data that it was absolutely necessary to know before the work could be proceeded with. The subordinate engineers carried the work as far as possible, trying in the meantime to reach their superior by telegraph. This they were unable to do. Finally they managed to get a telegram to the chief engineer, but by that time the work had almost come to a standstill and it looked as if it would be necessary to lay off the men, which would be a serious matter, as the work was of a special nature and the men had been broken in to it. The telegram to the chief engineer had explained the way matters stood. He called one of his assistants by telephone and gave him enough instruction, from the data on the blue print, to enable the work to proceed until the print could be expressed to the fair grounds. The two engineers, although many miles apart, discussed the construction and mapped out their plans, just as well as they could have done if they had been in two rooms in the same building. If it had been impossible to reach the chief engineer by telephone, undoubtedly the work would have been delayed several days, as the instructions were of such a nature that they required discussion, and it would have been practically impossible to have given them by telegraph.

The telephone exhibit at the Louisiana Purchase Exposition even at this early date promises, without the shadow of a doubt, to be the largest and most complete telephone exhibit that has ever had a place in any exposition. It will be located, of course, in the Palace of Electricity, which is one of the most conspicuous exhibit buildings on the site. As one approaches the interest center of the site, along the Grand Court, the Electricity Building is one of the innermost of the semi-circle of buildings. Its neighbors are the Building of Education and Social Economy on the east, Varied Industries on the north and Machinery Hall on the west. To the south is the Grand Lagoon and Cascade Gardens, the point upon which the exposition architects and artists are lavishing the greater part of their efforts, now that all of the details of the main picture have been decided definitely. The design of the Electricity Building is Corinthian. It is keystone in shape and is built with an open court in the center. The court, which will be occupied by a garden has an area of about an acre. The Palace of Electricity is reached by a bridge of exquisite pattern, having a span of one hundred and fifty feet and the building is entirely surrounded by over a mile of lagoons. Its dimensions are, 406 x 520 x 520 x 758 feet. The cornice is 60 feet in height and is of but average size as compared with those on the other buildings. The building covers eight acres, while the Electrical Building at the Chicago exposition covered only five. It is now practically completed and the interior is being decorated. The cost will be $399,940.

A few figures relative to the Palace of Electricity may be of interest. The building stands on 15,000 linear feet of piling, each pile being 26 feet long. To glaze it 58,000 square feet of glass were required and its roof has an area of 385,200 square feet. It is ornamented with 50,000 tons of staff. In its construction four million square feet of pine were used and 8 tons of nails. A train load, weighing 625 tons, of bolts, rods and building hardware was used. Over 100 car loads of material went into the building. All power for the electrical exhibits will be supplied from Machinery Hall adjoining the Electricity Building on the west. A great permanent power plant to light the exposition and supply it with power is now in course of erection.

In regard to the exhibit of telephones it is impossible to say now what proportion of the entire electrical exhibit will be devoted to the telephone industry, however, over 50 per cent. more space has been applied for than is available, but when the general rule adopted at the exposition, which is to favor working exhibits, is brought into force, many of the surplus applications will be excluded. The greatest invention and the one that has done the most to develop the telephone industry is the multiple switchboard, and considerable space and attention will be devoted to showing the board in the course of manufacture and in operation. Exhibits illustrating the making of telephones and supplies, encouraged by the working exhibit ruling, will undoubtedly be many and it will be interesting even for the layman, to see how a switchboard or telephone is constructed from the many component parts.

A few facts about the telephone exhibit at the Columbian Exposition at Chicago, might not be apropos. At that time the Independents were not so strong as they are now, so the Bell Company had the largest exhibit. This company also had interesting exhibits at the fairs at Omaha and Buffalo. The Western Electric Co., had a constructive exhibit as they will probably also have at the St. Louis Exposition. The Bell Telephone Company had at the Chicago fair a historical exhibit tracing the development of the telephone from the early, rough, experimental toys to the finished machine.

STEPS IN THE EVOLUTION OF CIRCUIT DESIGN

ARTICLE XVI.—THE TWO, FOUR, EIGHT AND TWENTY VOLT SYSTEMS

By J. C. Kelsey.

So far we have dealt with a hypothetical common battery system, showing the general design of line and cord signals, without considering many of the details. So far we have only examined that system which shunts the cord lamps, but there are the retardation systems, which open the cord lamp circuit. The purpose of this article is to discuss the voltage of the lamps, cord, line and auxiliary; the resistance of the series and shunt spools, the character of the operating set, and the general efficiency of a system using four volt lamps for signal purposes. Up to this time, the common battery operator's transmitter had not been developed, and all the exchange transmitters were only adapted for a two volt battery, so that alternate transmitters were connected to one cell of the four volt battery, while the other half were connected to the other two volt cell, thus enabling a four volt charging generator to be used. The use of transmitters in this alternate fashion made the quantity of charge in the cells vary, showing that one cell had too many active transmitters depending upon it.

Another weakness of this method was the likelihood of cross talk.

There is another reason for a duplicate set of batteries, beside that of charging the transmitter battery. The same batteries are used for lighting the line lamps, and require a voltage of four, and no more. Every other day one battery must be charged. The voltage rises from four to five volts during a complete charge, so if the line lamps were on this battery during the charge, they would be subjected to a higher voltage than they could safely stand. Five volts represent an over pressure of 25 per cent. Would it not be rather hard on a 110 volt lamp to be treated to a 25 per cent. over voltage, or 140 volts? This treatment of a lamp continued day after day, will shorten its life perceptibly, particularly the early four volt lamps. The cord lamp was also a four volt lamp. Owing to the conditions of opening the cut-off relay, it is necessary to put the cord lamp in series with the cut-off relay. The lamp lights the instant the sleeve of the plug touches the sleeve of the jack, which causes the immediate opening of the cut-off relay. The hot resistance of a four volt lamp is twenty ohms, and the resistance of cut-off relays is low for reasons heretofore explained. In this system, it equals that of the lamp; being therefore twenty ohms, hot or cold. To supply these with the proper amount of battery, the amount being one-fifth of an ampere, would necessitate the voltage which would supply one-fifth of an ampere to forty ohms. Current is equal to volts divided by ohms, or voltage is equal to current times resistance. Then 40 times one-fifth is eight. Our battery, which we will call the supervisory battery, has a voltage of eight volts. To charge this battery every day would necessitate a ten volt generator. To put the lamp and cut-off relay in series with ten volts, means that each will receive five volts; too much for the lamp. It is necessary, therefore, to have two batteries in duplicate. While one is being charged, the other is discharging, and the lamps do not receive an excess voltage. The life of a supervisory lamp is much shorter than that of a line lamp, by reason of conditions depending upon the manner of the busy test, which will be more fully taken up later. Another reason for a duplicate set of batteries lies in the fact that in large exchanges the discharge of these batteries is enormous, and runs up to 1,600 and 2,000 ampere hours daily. These batteries were originally of 2,000 ampere capacity. To charge these at a less rate than they are discharged will take all day, and a part of the night. To charge them while discharging them into the office load would necessitate a much larger generator. It surprises people to think that three horses working twelve hours could no more than furnish energy for a busy exchange.

The line battery is composed of ten cells, and is being charged all day while in use. In this case, the battery floats on the line, and the voltage existing on all lines runs from twenty to twenty-five volts. But some care had to be exercised to keep the noise of the charging generator from being heard. This was partially accomplished by means of a coil, enclosing a core of iron, the impedance of which smoothed off the generator impulses. With the class of generators in use in 1898, noiseless running could be nearly attained by shifting the motor brushes to a noiseless place.

So the battery plant is composed of five batteries, consisting of twenty-two cells in all, with 354 elements. The latest system uses one signal battery of 22 volts, or 11 cells, and 165 elements. From this, we can see much has been saved in equipment over the old method. The four volt lamp may be compared to the present twelve and twenty-four lamps by the statement that the trouble sheet of an exchange using high voltage lamps shows a monthly destruction of ten lamps, while with the four volt lamp the account was 166 a month. Two thousand lamps a year at thirty-five cents, then, would show a $700 annual lamp bill opposed to 120 twelve and twenty-four volt lamps at 20 cents, or $24.

ELECTRICAL MEASUREMENTS—ARTICLE XVII.

CONDUCTIVITY TESTS

By Arthur Vaughan Abbott.

CASES often arise when it becomes desirable to measure the conductivity of one wire, perhaps to ascertain the resistance of one side of a given line, and the customary plan is to ground the distant end of the wire to be tested; attach the other end to the post *C* on the bridge, Fig. 1, and ground the other post *D*. Then the rheostat is unplugged and the resistance of the circuit formed by the wire and ground measured in the ordinary manner. Usually the resistance of the ground is supposed to be zero, and therefore the number of ohms given by the bridge is taken to be the resistance of the wire measured. There are many objections to this method, particularly where the line is short and the resistance very low. It is by no means safe to assume that the resistance of the ground is zero, for even ordinary moist earth will show a very measurable resistance when compared to that of a short line of large wire. Again, it is difficult and in many cases almost impractical to obtain a proper and thorough connection with the earth. In cities it is customary to ground upon the water pipes or gas pipes. The former expedient is usually fairly reliable, though in some cases defective pipe joints, and reservoirs constructed of concrete may introduce quite a sensible resistance in the water system. To ground upon a gas pipe, particularly, for resistance measurement is hazardous, for the joints in the gas mains are often discontinuous electrically, and furthermore there may be several sets of gas mains, and the bridge may be grounded upon one set and the remote end of the line under examination upon another set, so that in reality a large resistance is interposed between the end of the wire and the bridge. But the most prolific source of trouble is due to earth currents, which in these days of trolley roads are of almost universal occurrence. Within a few miles in the larger cities it is not uncommon to find a difference of potential of from 5 to 20 volts.

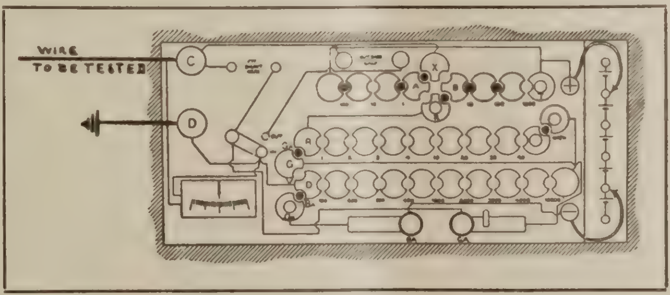


Fig. 1.—Layout for Conductivity Test.

Now, it is obvious that if such a difference of potential exists between the ground upon the bridge and the ground at the remote end of the wire to be tested, a very perceptible current will flow over the wire under examination, and this will entirely upset the operations of the bridge and cause the inspector to obtain the most astonishing results in the way of resistances. It is, therefore, preferable, when possible, to resort to one of the so-called loop methods, when the conductivity of a single wire is to be measured. If another wire is at hand whose conductivity is accurately known, the loop method is most simply performed by joining one end of the known wire to the post *D* of the bridge and the other end to the remote terminal of the unknown wire, while the end of the unknown wire at the testing station is as before connected to the post *C*. The resistance of the entire loop is then measured by the bridge and the resistance of the known wire subtracted from the total resistance thus found, the remainder being the resistance of the unknown wire. It is impossible, however, to rely upon this method, unless one is accurately acquainted with the known wire which forms one-half of the loop, and it is decidedly unsafe to assume that such a testing wire is free from high resistance joints, or other faults which may seriously vitiate the results obtained. If, however, two wires are available in addition to the wire whose conductivity is desired, it is possible to so test as to obtain accurately the resistance of each of the three wires and thus gain that of the one desired. For this purpose proceed as follows:

Let the three wires be designated, respectively, 1, 2 and 3, in which No. 1 is the wire whose resistance is desired. First join Nos. 1 and 2 at their remote ends, measure the resistance of this loop with the bridge and let it be termed R_1. Next loop wires 1 and 3 and measure their resistance, calling it R_2; lastly loop wires 2 and 3, measure and denominate the resistance of this loop as R_3. Let r_1, r_2, r_3 represent the actual resistance of each of the wires, 1, 2 and 3. Now, as each of the wires has been looped first with one and then with the other of the remaining two, the sum of the measurements of the three loops will be the sum of the individual resistances of the three wires taken twice over, and consequently $\frac{R_1 + R_2 + R_3}{2}$ = the sum of the resistances of the three wires. Now, if we subtract R_1 from this result, the remainder will be the resistance of r_3. Similarly, if we subtract R_2 we can get r_2, and by subtracting R_3 we can get r_1. Let us take an example: It is required to determine the conductivity of three wires, 1, 2, 3; when Nos. 1 and 2 are looped the resistance (R_1) is 30 ohms; when Nos. 1 and 3 are looped the resistance (R_2) is 40 ohms, and when Nos. 2 and 3 are looped a resistance (R_3) of 50 ohms is found. Then the resistance of the three wires is $\frac{30 + 40 + 50}{2} = 60$, and therefore the resistance r_1 of wire No. 1 is $60 - 50 = 10$; the resistance of r_3, or wire No. 2 is $60 - 40 = 20$, and finally the resistance r_3 of wire No. 3 is $60 - 30 = 30$. By this method all questions of error, due to the unknown properties of an assumed testing wire and the possibility of the derangement of the results from earth currents are entirely eliminated and one is able to obtain the individual resistance of three wires by three measurements. Too much care cannot be taken when measurements are made in proximity to trolley roads. Few people, who have had no experience in this line, imagine what large stray currents flow through the ground in cities.

EXCHANGE SERVICE AND EQUIPMENT

By W. F. Gradolph.

I DO not expect to say anything new, but to simply state in as clear a manner as possible my ideas relative to exchange service and equipment. One of the most serious criticisms I have had to suggest as to Independent telephone companies is their lack of system. They have engaged in the telephone business in too many cases as the original Bell company did, and have been learning by experience rather than by observation of what has already been threshed out. It is very essential now, as the Independent systems are becoming larger, that first-class construction shall be the rule rather than the exception. Some will no doubt say too much system, but as the business develops it will begin to appear that too much system is less expensive and less foolish than too little, and if managers, superintendents and operators of Independent plants shall more carefully and fully analyze the cost of conducting the business in the different departments and their results, many errors will be avoided and the ledger balance will unquestionably grow on the right side. Do not reduce your rates below a reasonable point, for the moment you do so you are doomed.

Begin the education of your subscribers, by taking them into your confidence. Tell them the truth about your business and its results, and after giving them good service insist upon a fair profit and reasonable returns upon the actual investment, and you will find that the people will be ready to pay your price. My ideas are to give service with metallic circuits and individual lines. Party lines, in my mind, are a delusion and a snare, when used in a city exchange, and it is evident that no device has yet been invented which will allow more than two parties to use the line at the same time; therefore, when any party or pair of parties hold the wire on a party line others must wait. Every one knows how impatient the average telephone user is to get service the moment he wishes it, and should party line service be resorted to, the difficulty of getting the party desired is greatly increased. The party line was introduced by the Bell company, to meet the low rates of the Independent telephone companies, by reducing the rates for such service, thereby maintaining practically their old rate, if not actually increasing the revenue per line. Party lines appear to be successful if properly developed in connection with farmers' lines, and can, in this field, be made to yield a fair profit to the company.

This article may be divided into three parts, as regards the operation, service and equipment. Reliability, good transmission and promptness we will call these classes. The first is the most important, for business men of to-day will not endure a service that is unreliable. To make the service reliable, the second—good transmission—is necessary. For good transmission and apparatus we must depend upon the reliable manufacturer. The third, that of promptness, is essential to popular service. Slow service is very annoying to the business man. It is necessary, therefore, to give him an immediate reply, for if he is compelled to wait, even for a short time, he becomes dissatisfied. Remember, a public is being served that is both fault-finding and criticising, and which has all sorts of whims and fancies, but who, at the same time, appreciate and are willing to pay for a first-class service. Your success depends upon the class of service you give. It is essential to good service, that you have first-class, reliable apparatus and outside construction. Outside construction is as important as the switchboard and its accessories, which fact many Independents do not appreciate. The Independent telephone interests are in greater danger to-day because of the inferior apparatus thrown on the market, than from any other cause, as some of the apparatus manufactured and sold is a curse and disgrace to Independent telephony. It is to be regretted that exchanges now in course of construction are being equipped with this worthless and inferior equipment. The writer realizes that it is difficult for the average Independent telephone company to select the best apparatus, because its experience has been limited to the apparatus in use some years ago, or because of its inability to keep pace with the unparalleled strides that have been made in the manufacture of telephone equipment. Any company contemplating the purchase of a new board or starting into business cannot make a mistake by employing the services of a practical telephone engineer and acting upon his superior judgment as to the type of switchboard and construction to be used.

The writer believes that in any exchange having over a hundred subscribers the proper thing to install is common battery, lamp signal, board when suitable arrangements can be made for current. The board should be of the double supervisory type, as this is the most reliable for promptness and speed. This is all dispensed with when using a common battery, lamp signal, double supervision, board, where the operator knows by a glance, whether the conversation is finished or the called for party has answered.

When enough subscribers are obtainable to require the services of three or more operators, the writer believes in the installation of a multiple switchboard, so that each operator handles her calls direct without the assistance of other operators. With the transfer system the service is impeded, there are unnecessary contacts to talk through, and there is a permanent expense of operation, and on larger boards of the transfer type, the work is doubled, for nearly all calls have to be transferred to a second operator. Another great advantage of the multiple board is that all calls can be operated and attended to by one operator, who can sit at one position and attend to all calls through the multiple jacks. This gives her control of the whole board, and gives better service, than the magneto type of switchboard, and also it is cheaper to operate, as fewer operators are required. It also dispenses with local batteries and with an expensive piece of apparatus in the subscribers' equipment—the generator, with its gears, shunts and commutators.

The writer, while in several western towns, had occasion to see the monthly wirechief's reports. They were compared with reports of the same exchange when it was using the magneto system, and it was found that the trouble with the new system was about 70 per cent. less than with the magneto system. The trouble in a modern central energy or common battery telephone is reduced to a minimum. There is nothing but the transmitter, receiver, switch hook, bell and condenser at the subscribers' station.

Telephone men are beginning to realize that it is of the utmost importance that the apparatus, cable and line construction be of the very best, especially when the difference of maintenance between well and poorly constructed lines is made apparent. In building it is well not to neglect any of the details. It may seem like a waste of money, but it will be realized in the end that it was money well invested. The interior wiring should be well protected and the telephones installed in a neat and substantial manner. First-class help should be employed and the cable and line put up in first-class shape. As a result it will be seen that the cases of trouble per telephone are less than in any neighboring exchange.

Few managers have realized the importance of equalizing the loads among the operators. That is, place enough lines before each operator to properly load her position. The switchboard, therefore, must be properly designed and the load equalized by means of an intermediate cross connecting board, by use of which a subscribers' line signal and answering jack may be shifted to any operator's position without changing the subscriber's line number. In this manner the busiest subscribers may be shifted or divided among the operators, exchanging business lines for those of residences. A peg count will determine which operator is doing the most work, and enough lines can be shifted from operators who are overloaded to operators who are not, so that each operator can be given approximately the same number of calls for the twenty-four hours. This number is practically 2,000. About one-eighth of the calls answered during twenty-four hours is approximately the number answered during the busiest hour. This gives two hundred and fifty answered during the busiest hour, which is not excessive for the average operator. An operator answering this number of calls on a switchboard of modern construction is not excessively busy, and with good training and team work she can give better than four-second service. Operators as a rule prefer the busy positions.

The operating force is one of the most important factors of the telephone exchange. If the operators are well disciplined and courteous, the public are quick to notice and show their appreciation, for business men notice a second or two when awaiting central's "Number, please." This, given in a brisk, clear tone conveys the idea of discipline. The operating force is nearer to the telephone public and influences it to a greater extent than any other factor connected with the company. We must make our service popular through courtesies, dispensed by the operators.

Few managers realize that operators should be trained before being placed at the switchboard. This is an error and an exchange of any size should have a sort of preparatory school, where the operator can be taught the rules, which should be explained to her in their proper manner. She should be taught the names and functions of the switchboard parts and have sample parts given her for inspection. She should be taught the location of business houses, all public buildings and streets. Instruction should be given as how to properly handle the cords, so as not to bend them close to the plug, and again, in taking down a connection, not to pull on the cord, but to do so by taking hold of the plug proper. Every manager must know that the cord account of an exchange is the largest item of its maintenance. The operator should be taught to answer two or three calls at the same time without interference, and to use the left hand as well as her right. After this training an operator is competent to take a position at the switchboard.

Conduct the operating room upon the merit basis and make your promotions according to an operator's efficiency. Occasionally go among your subscribers, call from their places of business, and time the operator as to the answering of your call. Keep a record of this and make your promotions accordingly. Attention to business can be rewarded in various ways, such as giving the most desirable hours, a small raise in wages, a day or two off duty with pay, or prize money. Each month show your operators in this manner that you appreciate their efforts. Put your operating room in the hands of a good telephone man, one who is familiar with the business in every detail and who recognizes and realizes the necessity of prompt, courteous and efficient service, and who at the same time knows how to handle the telephone public. If the methods here set down are followed, the telephonist will be following the ones that my experience has shown to be the best and there is no reason why he should not be successful.

PENNSYLVANIA R. R. EXPERIMENTS WITH TELEGRAPHONES.

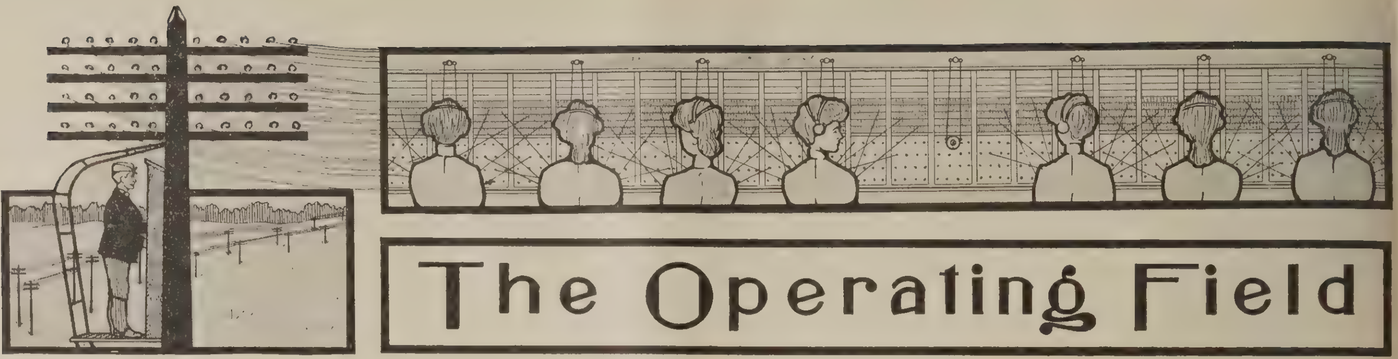
By H. A. Lane, *Special Correspondent.*

OFFICIALS of the Pennsylvania railroad, at Pittsburgh, have recently tested a device for the recording of telephone messages. The machine which is called the Telegraphone was invented by D. Pousen, of Denmark. The principle on which it operates is the recording of sound waves by localizing magnetism. The waves are recorded on steel discs, piano wires or steel bands. One may talk into an ordinary receiver and have his conversation recorded by means of the instrument. The machine has a number of magnetic attachments which give off on separate wires the conversation recorded on one wire. By means of long spools of wire it is expected to make some radical changes in the system of electrical communication now in vogue, as a man in Pittsburgh may talk one hour, and the conversation be recorded on a spool which is then arranged in connection with a line to New York. The spool is then caused to revolve at a high rate of speed, fifty times as fast as it revolved originally. A second spool at New York receives the message and by being made to revolve slowly it gives off the message again, unreeling it, as it were. The record is destroyed by simply passing a magnet over or across it, when the discs and wires are again ready for use. The chief objection to the use of the telephone by railroads, has been the lack of a record of the message sent. The advantages of the Telegraphone are being carefully considered by the local Pennsylvania officials and will result, it is said, in a great improvement in the yard system of telephones.

A PRIVATE TELEPHONE CABLE.

A CREW of men and four horses were recently engaged in laying a cable across the Connecticut river at Higganum, Connecticut. The cable was laid to accommodate one single subscriber, W. H. Brown, who lives in a large house across the river from the Higganum railway station. From the river to the house the wires are supported on poles for a distance of 1,400 feet. The cost of the installation was $400. This is but one of the many instances that serve to show of what value business men like Mr. Brown consider the telephone. Mr. Brown is a salesman for an agricultural house.

In laying the cable, the end to be landed on the east bank of the river was secured to three boats fastened abreast, and four horses pulled the boats and the end of the cable, across the river. The operation required only thirty-five minutes and this included two stops for backing up the horses and taking a new hold on the line fastened to the boats. The cable is 1,350 feet in length and weighs 3,300 pounds.



The Operating Field

WESTERN TELEPHONE & TELEGRAPH'S DIVIDEND.

THE Western Telephone & Telegraph Co. on August 1 paid a semi-annual dividend of 2 per cent. upon its preferred stock, says the *Boston Statist*. Under the terms of the reorganization plan of the Erie Telephone Co., the predecessor of the Western Company, the preferred stock of the Western Telephone & Telegraph Co. was to be 6 per cent. cumulative after two years, and as the company began business on Feb. 1, 1902, dividends begin to accrue at the new rate on and after Feb. 1, of next year. The ability of the company to pay 6 per cent upon its preferred stock, in view of the earnings shown in the annual report covering the fiscal year ended Jan. 31, 1903, has been questioned in some quarters, and it has been intimated that the rate might not be raised during next year, but that the excess which would be required to pay dividends at the rate of 6 per cent. as against 4 per cent. paid would be credited to the stock.

For the fiscal year ended Jan. 31, 1903, the company showed net earnings, after the payment of expenses, fixed and other charges and depreciation, amounting to $673,849. Dividends at the rate of 4 per cent. per annum on the preferred stock required $640,000, which left a balance applicable to $16,000,000 of common stock of $33,849. Dividend requirements on the preferred stock at 6 per cent annually would be $960,000 and on the basis of the above showing net earnings would fall short of the amount needed by $286,157.

It is stated that earnings for the present fiscal year have materially increased, but it is doubtful if they can show a sufficient enlargement to make up the deficit that is apparent from the above statement. Recent sales of the bonds, preferred and common stock have been made at new low records, par for the bonds, 85 for the preferred and 13 for the common stock, which compare with 106½ for the bonds, 106½ for the preferred stock and 33½ for the common. On this basis the total depreciation in the market value of all of the securities would be $7,370,000, as follows:

	Market Value.		
	High	Low.	Depreciation.
Bonds	$10,650,000	$10,000,000	$650,000
Preferred stock	17,040,000	13,600,000	3,440,000
Common stock	5,360,000	2,080,000	3,280,000
Totals	$33,050,000	$25,680,000	$7,370,000

NORTHEASTERN GIVEN ENTRY OF LEWISTON.

AT a meeting of the mayor and aldermen of Lewiston, Maine, held recently, the Northeastern Telephone Company was given permission to install a plant in that city. The permission was, however, subject to some conditions, among which were the following: A sale, lease, or transfer of the property or franchise of this company, whereby competition is destroyed or whereby the rates herein named are increased, shall cause a forfeiture to the city of all conduits and poles then installed in said city. The rentals for single service connection in the cities of Lewiston and Auburn proper, shall not exceed $24.00 per year for residence use, and $36.00 per year for business uses. The city of Lewiston, for municipal purposes, and free of charge, shall be entitled to the use of as many telephones as may be needed for municipal purposes; and to the free use of one duct in all underground conduits in the city of Lewiston for the installation and operation of its police and fire alarm telephone and telegraph wires; and to the free use of all poles erected and maintained in said city of Lewiston by said Lewiston-Auburn Telephone Company for the stringing and maintenance of wires and cables for said fire alarm and police telephone and telegraph service. Within ten days from this date the company shall file its acceptance in writing, of this permit, with the limitations and conditions thereto attached.

The action is endorsed by the Lewiston public generally, who look forward to the prospect of having two telephones, and better ones, too, for what one used to cost. There is quite a battle being raged in New England between the Independents and the Bell, and at the end of each individual contest the Independent Company appears to be victor. Lewis A. Goudy, General Manager of the Northwestern Telephone Company, seems to be the independent that is doing the work for the cause. The franchise just secured at Lewiston marks the start of another link in the chain of exchanges which is rapidly being welded throughout New England.

UTICA COMPANY'S GROWTH.

By W. H. Campbell, *Special Correspondent.*

EDWARD L. CLINE, superintendent of construction for the Utica Home Telephone Company, Utica, N. Y., recently informed the directors that the Company's long distance lines to Little Falls, Herkimer, Mohawk, Ilion, Frankfort, Rome, New Berlin, Waterville and Clinton were completed. He also announced that the direct line from Rome to Little Falls, a distance of 37 miles, was in perfect working order and that the revenue for the first day's business was larger than anticipated. All of these long distance lines connect with other Independent companies and extend into many different counties. New telephones are being installed at the rate of 20 per week. For some time the local company has been trying to secure a franchise in Whitesboro, a prosperous village, four miles west of Utica, and it is expected that the deal will be consummated in the near future. In this event the company will be earnest in its efforts and will probably erect a small exchange there. The Utica Telephone Company has not slackened in its growth, by any means, for men are in the field ready to buy many of the exchanges in the smaller villages, and it is very probable that two or three will be acquired in a short time.

An interesting fact which shows the unstinted growth of the company is that on April 1 the company received 7,537 calls and that on August 1, 20,431 were answered. On the day of the election of the Pope, with 1,903 working telephones, 40,329 calls were received. Many of the Bell subscribers in this city inquired over the Bell lines for the result of the election, which was made known by the ringing of church bells, but the operators were unable to answer, as the Bell managers made no arrangement to secure the news. The Home directors had, however, and answered all inquiries promptly. Because of this and other defects in the Bell service, this company's business is slowly ebbing away and the directors are about to try some new schemes to regain the lost trade. It was announced in this paper that additional party line telephones would be put in at lower rates, but it is now learned that the subscribers who have party line telephones objected to the idea and filed a protest with the company. The company refuses to make public what new scheme they intend to adopt.

UNITED STATES TELEPHONE'S STATEMENT.

THE statement of earnings and expenses for the five months ending May 31, 1903, of the United States Telephone Company is herewith given. It shows a surplus for stock for the period of $21,000. On January 1, 1903, there was a deficit of $21,138. This comes from the accumulation of interest and operating expenses before the property was able to pay its fixed charges. The statement is given as follows:

		First 5 mo., 1903.
Gross earnings		$151,726.32
Expenses	$85,519.63	
Taxes	3,602.30	
Expenses and taxes		89,121.93
Net earnings		$62,604.39
Bond interest	$38,854.17	
Miscellaneous interest	1,867.41	
Total interest		40,721.58
Surplus for period		$21,882.81
Deficit, January 1, 1903		21,138.32
Surplus as above		21,882.81
		$744.49
Sundry profit and loss items		799.07
Surplus, May 31, 1903, as per balance sheet		$1,543.56

PROGRESS OF THE CHARLESTON TELEPHONE COMPANY.

INDEPENDENT telephone service has been furnished in Charleston, S. C., for a number of years. The plant was originally constructed by the Carolina Mutual Telephone Company, and about five years ago was purchased by the Gordon Telephone Company, which had been operating in West Virginia and Maryland. When the exchange passed into the hands of the Gordon Telephone Company steps were immediately taken to improve the service and place all subscribers on a contract basis. Since the improvement in service a large number of additional subscribers have been connected with the exchange, in fact the number of telephones in service has since grown over 200 per cent. This has been accomplished not by the wholesale cutting of rates to meet competition with the Southern Bell Telephone Company, operating there, but by good service, courteous treatment and pushing the business. The rates range from $24.00 for residences and $40.00 for business service, up to over $100.00 per annum, according to the location of the station. Metallic circuits are used entirely with individual line service. At the time the Gordon Company commenced operating in Charleston there were no Independent long distance lines running out of the city, and only one or two short ones were operated by the Bell. The Independent Long Distance Company now known as the Island Telephone Company, which is owned by the local company, is furnishing service from about 50 toll stations. This system connects the various Sea Islands in the vicinity with Charleston by means of sub-marine cables and standard construction. Its lines also extend to points on the main land. The business done over the lines has been continually increasing each year, the fiscal year ending July 1st, 1903, shows an increase of over 25 per cent. as compared with the corresponding preceeding year.

NOTICE TO MICHIGAN TELEPHONE BOND HOLDERS.

NOTICE has been sent out by the bondholders' protective committee of the Michigan Telephone Company, to the bondholders who have not deposited their bonds under the trust agreement, asking them to do so. The notice is as follows:

"On July 15, 1903, the Circuit Court of the United States entered an order for the foreclosure of the mortgage dated Jan. 2, 1899, securing the above-mentioned bonds and decreeing the sale thereof. It is expected that this sale will take place the latter part of September after proper advertisement. For the proper protection of the rights of all the bondholders it is very desirable that they should act as a unit. To this end there have been deposited at the office of the Old Colony Trust Co., under an agreement there on file, $4,422,000 bonds out of the total amount of $4,715,000 bonds issued under the said consolidated mortgage. There therefore remain outstanding in the hands of non-depositors bonds to the amount of $293,000.

"Although the time for deposit of the said bonds has expired, the committee has determined to allow the small number of bonds still outstanding to be deposited under the terms of the original agreement. All bondholders are, therefore, requested to deposit their above described bonds with the Old Colony Trust Co. of Boston and receive therefor the negotiable receipts of said trust company. Deposits under this notice must be made on or before Sept. 15, 1903, but the committee will reserve the right to accept deposits thereafter upon such terms as they may exact."

PRIVATE SERVICE FOR PENNSYLVANIA STEEL CO.

COMMUNICATION by telephone will soon be established between the general offices of the Pennsylvania Steel Company, the East End Extension and the furnaces at Lochiel, Pa. The wires to insure private service are now being strung. The new line is being built by the United Telephone Company. The line from the East End to the company's office is already completed. Poles are now being set by the telephone company to Lochiel, and it is thought that within a month the system will be in service.

When this line is completed employees on any part of the company's plant will be able to get direct communication with any part of the United Company's system.

NOTICE TO ST. LOUIS EXPOSITION EXHIBITORS.

ATTENTION of prospective exhibitors at the Louisiana Purchase Exposition to be held at St. Louis is called to the fact that the exposition will open on the 30th day of April, 1904, and it is therefore desirable that all companies who wish to exhibit should have their applications in at once, in order that they may be properly provided for. W. E. Goldsborough, Chief of the Department of Electricity, announces that the Electricity Building stands completed except for the sculptural decoration in the way of the groups of statuary which will surmount the six towers and the other pedestals.

GOOD SERVICE AT JOPLIN.

THE Home Telephone Company, of Joplin, Mo., is endeavoring to so systematize its business as to keep a correct record of every department. One of the means it has employed is a secret test of the time elapsing between calling for central and receiving an answer. Out of a total of 500 calls tested, covering a period of eighteen days, the average time from the time a subscriber called central till they were asked "what number" was 2 2/5 seconds. No call extended over seven seconds, and only three calls were compelled to wait as long as five seconds for an answer.

NORTHEASTERN IOWA CONVENTION POSTPONED.

THE convention of the Northeastern Iowa Independent Telephone Association, which was to be held on August 11 in Cedar Rapids, Iowa, has been postponed and will be held September 25 at Cedar Rapids. A new exchange is being installed there which will make the city a particularly good one in which to hold the convention.

The Editor's Page.

MAKE THE SERVICE FIT THE CUSTOMER.

WHILE telephony is a new art the principles involved in the transaction of its business so closely resemble those of railroading that it is sometimes hard to understand why telephone managers fail to avail themselves of the experience of the older transportation company. Both of these great public servants deal in traffic. The railway transports passengers from place to place in order that they may confer with each other, using a car and a rail as a means of communication. The telephone company, using a wire, transports messages from place to place, saving its patrons the time and annoyance of a journey, but eventually both accomplish the same end by putting people into communication with each other. Experience has shown the railway company that its customers demand a varied service, and that it is impractical to satisfy all with one form of transportation, and for different grades of service varying prices are charged depending upon the kind and quality of transportation afforded. The public is at liberty to choose the kind of train by which it will travel, and usually cheerfully pays in proportion to the accommodations supplied. Thus the magnate demands his sepecial train and commands right of way over the regular schedule, so a trip from New York to Washington may spoil a $500.00 bill. The dainty belle must have her seat in the drawing room car so that, forsooth, the common herd may not even brush elbows with her. The rank and file take the coach in the common affinity that makes all men akin, while the newly arrived rustic from the isle as verdant as himself, seeks the immigrant car, to be presently paralyzed with astonishment at the interminable landscape that each mile of the railway unfolds.

Now, the telephone manager who expects to satisfy all of his subscribers with the same kind and grade of service would be as foolish as the railway superintendent who should attempt to crowd everyone into one car. There are those who must have a private toll line from New York to, well, Kamchatka, and are perfectly willing to pay uncomplainingly therefor. Another, and much larger class demand a single line so that under all circumstances, and at all times it may be instantly at their command. These are the Pullman passengers who will ungrudgingly pay an extra fare, provided they are supplied with correspondingly desirable service. Now comes the rank and file for whom a two-party line affords a service adequate for their needs, which may be offered them at a correspondingly reduced cost; and lastly the immigrant passengers, to whom it is fair to offer a service on a 4, 6 or 10 party line with an appropriate tariff for the transportation thus offered. Much of the friction which has arisen in the past from the use of party lines is due to a mutual misapprehension, both on the part of the subscriber and of the manager, who is sometimes tempted to supply a so-called party line service at lower rates, that shall to all intents and purposes be equivalent to that given by the single line. Naturally, the single line subscriber considers that the rate charged him is exorbitant for a service that is imperceptibly better than that offered to party line customers at lower terms.

HAVE A SUITABLE SERVICE FOR EACH.

On the other side, party line subscribers are apt to complain because in many cases they do not receive a service which is as uninterruptedly good as that of the single line customers. So in the past over the party line question reams have been written, and in the future, still more reams will be required in the endeavor to settle a question that is so simple as to hardly merit discussion, provided both the subscribers and the manager would treat each other in all respects with absolute fairness. The man in the immigrant car must not, and usually does not, expect Pullman accommodations for the price he pays. The belle in the drawing room car is defrauded unless her train is swifter, cleaner and in all respects surpasses that devoted to the motley crowd that follows the express. On the whole the public are fair minded and if *various grades of service* are offered them with *corresponding differences* in *rate,* they will usually select and pay uncomplainingly for that which they desire, provided they fully understand the nature of the service that they get, and provided it is made clear to each that each receives all that he is fully entitled to. It is both unjust and foolish to attempt to give party line service at a reduced price, that purports to compare to that offered to the single line subscriber at a higher rental. It is equally folly to institute only a Pullman service and attempt to extort from all customers the charges which that form of transportation must necessarily bear.

THE FIELD OF THE TELEPHONE.

ONCE a young man fresh from college came to that period in his life when he must choose a career. It is supposed that every young man when he reaches this point, gives the question very serious consideration. But this young man, being of an exceeding practical nature, is reported to have lain awake nights, reasoning out the pros and cons of the various trades, professions and callings. He thought of what he was most fitted for, but principally of that calling in which he would have the best opportunities. Finally, one day, he went to his father and said:

"I have carefully gone over the various lines of business open to me, and I have decided to accept a position with the ——— Telephone Company. The salary to start with is small, compared to several other openings. But I believe there are better opportunities in the telephone business than in any other."

The father, not being well posted on the possibilities of telephony, was greatly surprised at the decison of his son, and reasoned with him to change his decision, saying:

"I think you are making a very foolish move. Why, the telephone business is very limited. There are telephones only in the large cities and a few of the larger towns of the country. Of all the professions I can think of, it is the last one I would advise you to choose."

In substance this is the actual conversation between a father and son. The young man followed his decision and entered the telephone business. He is to-day enjoying a salary that makes him envied by his college chums and he is still a comparatively young man.

The story is suggested by an account of a watchman's telephone system, appearing on another page of this number of THE AMERICAN TELEPHONE JOURNAL. It shows, as columns of arguments could not do, the utility of the telephone, and its vast field. With this system, it is stated that two men can perform the work of ten, and with greater efficiency.

But little has been written of the marvelous opportunities of the telephone. And less has been accomplished toward the actual development of its possibilities. Of course, the telephone companies are kept busy keeping up to date on their orders for residence and business telephones, but they should not neglect the side lines or the by-products, as they might be termed. THE AMERICAN TELEPHONE JOURNAL has called attention to this fact before, but it is a question of such vital interest that too much cannot be written about it.

The Telephone in the Courts

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

LICENSE TAX ON COMPANY ENGAGED IN INTERSTATE COMMERCE VALID.

THE case of Atlantic & Pacific Telegraph Co. vs. City of Philadelphia, decided June 1, 1903, by the Supreme Court of the United States, and sustaining the right of the municipality to impose a license fee upon the poles and wires of a telegraph company engaged in interstate commerce, is of equal interest to telephone and telegraph companies. The city of Philadelphia brought suit against the Telegraph Company to recover the sum of $3,715 as license fees alleged to be due the city for the six preceding years. On January 6, 1881, an ordinance was passed by the city council imposing a license fee of $1.00 for each telegraph pole erected in the city. Another ordinance regulating underground conduits, wires, and cables, and providing for license charges for underground and overhead wires, imposed an annual license charge of $2.50 per mile of wire for overhead telegraph wires and $1.00 per mile for underground wires. The claim was made against the company under these ordinances. In 1886 a further ordinance was passed, removing all charges upon underground wires. The chief of the electrical bureau of the city testified that the removal of all charges on underground wires was an inducement to have wires placed underground. There was evidence of the expenses of the electrical bureau for the years in question, and that such electrical bureau supervises all electrical work upon the streets. There was no testimony that definitely disclosed how much of the labor of that bureau was in respect to electric light wires and poles. The company showed the extent of its own supervision and the cost of repairing, maintenance and supervision for the years of 1885 to 1891, inclusive, to be only $1.60 3/7 per mile. In a trial in the Circuit Court of the United States for the Eastern District of Pennsylvania before judge and jury, the city secured a verdict and judgment for the full amount claimed, with interest.

The company appealed. The Supreme Court reversed the judgment and remanded the case for new trial. In its decision the court said that the question presented was the validity of the charges imposed by the city of Philadelphia upon the defendant, a corporation engaged in interstate commerce. The tax sought to be collected was not a tax upon the property or franchises of the company, nor in the nature of rental for occupying certain portions of the street. Nor was it a charge for the privilege of engaging in interstate commerce, but it was only for the enforcement of local governmental supervision. The court held that the city had power to pass such an ordinance as this, requiring the company to pay a reasonable license fee for the enforcement of local governmental supervision, the municipality not being bound to furnish such supervision for nothing. But the license in question, not being for the purpose of raising revenue, must be reasonable in amount. Prima facie it was reasonable, and it devolved upon the company to show that it was not. Upon the testimony, the court instructed the jury to find for the plaintiff the full amount claimed. In support of this action, it was contended that the question of reasonableness was one to be determined by the court and not by the jury, and that there was no testimony from which either a court or jury could find the charge unreasonable. Upon these questions the court held that the reasonableness of the license charge should have been submitted to the jury and that there was testimony from which it might be found that the charge was unreasonable. Atlantic & Pacific Telegraph Co., the city of Philadelphia, 47 Sup. Ct. Rep. 817.

AN UP-TO-DATE ORDINANCE.

THE town council of the borough of Prospect Park, Pa., has passed a very comprehensive ordinance granting consent to a telephone company that applied for a franchise, to construct underground conduits under the public streets of the borough, and to erect the necessary distributing poles and place wires and cables thereon for telegraph and telephone purposes. The pole lines are to be erected on such public streets only as cannot be served by the main underground conduit. With the written approval of the highway committee of the borough, the company may place its wires on the poles of other companies. The highway committee of the council has power to designate the location of all poles and overhead wires and must give its consent before any trees interfering with wires of the company can be cut or trimmed. It is provided, however, that this shall not relieve the company from, nor impose upon the borough, any liability to the owners of premises for damages arising from the cutting or trimming of interfering trees. The construction of all conduits, ducts, pipes, manholes, distributing poles and other appliances shall be under the supervision of the highway committee, to whom a detailed plan of the work must be submitted. All materials excavated and paving removed must be replaced. The work is subject also to the general police regulations of the borough. The company shall indemnify the borough against all claims and suits arising from the construction or maintenance of the system. It is to reconstruct at its own cost any parts of the system when the towns deem it necessary on account of any change of the grade of the streets. Not more than 600 feet of any street is to be open at one time, and then barriers must be erected about the opening. It must keep all portions of streets that have been opened in good repair for the term of two years from the completion of the work. The company must furnish at its own expense six wires along its whole line for the exclusive use of the borough for fire alarm, police and other municipal purposes, but such wires are not required to transmit current at any voltage exceeding 50. This ordinance is not to be construed as conferring any exclusive right upon the company nor to permit it to interfere with the system of any other company. The company has to pay to the council $50.00 to cover the cost of enacting the ordinance and file with the town clerk a bond of $5,000 to insure its faithful compliance with all terms of the ordinance, and in case it fails to do so within 30 days, the ordinance becomes void.

A NOVEL TELEPHONE PATROL SYSTEM

By P. Kerr Higgins.

SOME of the finest residences in Los Angeles are located in the "West Lake" district. The greater part of this portion of the city is patrolled by special officer C. L. Foster. Lately Mr. Foster found his beat becoming too large. The demands for his services became too numerous and he was unable to respond to calls as quickly as he wished. Being an up-to-date man he hit upon the idea of bringing to his aid the telephone and the bicycle. These, he felt, with the aid of an assistant, would enable him to give the efficient service that he desired. With this end in view he approached the Sunset Telephone & Telegraph Company (Bell) and explained his ideas to them, but was told that they could do nothing for him. The Home Telephone Company was then turned to and the explanations made as before. The result was that the system which is here described was installed by the writer. It is giving perfect satisfaction and has been inspected and tested by the city and police departments and was pronounced by them to be the most efficient that they had seen.

At several locations, which can be seen from all points of the watchman's beat, are fastened to the tops of the telephone poles, 32-candle power incandescent lamps. Telephones, six in number, are fastened to the poles at a convenient height. At Mr. Foster's residence the switching arrangement is installed. It consists of the terminals of a special circuit on which all of the telephones are connected in multiple. There are no bells at the telephones. There is, however, a bell on the telephone in Mr. Foster's residence which is on the same circuit with the others. The special telephone circuit and the wires which carry the current used for lighting the incandescent lamps are run on a special four-pin cross arm, which is fixed above the regular cross arms by means of braces. All the wires are insulated. The wires are carried down the sides of the poles in iron pipe to avoid possible accidents. All of the incandescent lamps are connected in multiple and are colored a distinct red. At any hour of the night any of the watchman's subscribers may reach him, by first calling the exchange in the regular way and being connected to the special private line. Mrs. Foster will answer the call and if an officer is wanted she will turn a snap switch which will allow current to flow out onto the line and through the red incandescent lamps, lighting them. The watchman seeing the red lamp will immediately go to the nearest one of the private telephones, call in and receive any directions that the subscriber may desire to give. The boxes which contain the telephones are under lock and key and are only available to the patrolman in charge of the district.

A series of tests have shown that in no case was more than two minutes consumed from the time the call was made until the officer was on his bicycle en route to answer the call. When a call is answered the incandescent lamps are turned off. In case of fire, accident or any emergency, the main exchange can be called from any pole telephone or from the one at the house, and connection can be made with any other telephone station in the city. All calls from this special circuit are given preference over others. This system is effective not alone when in use, but it has a silent effect as all of the boxes which enclose the telephones are painted blue, numbered and have lettered on them, "Foster's Private Patrol." The system has a further usefulness, which was demonstrated recently, in that it works in harmony with the police department. The lighting of the red signal lamps puts the regular officers in the vicinity on the lookout so that it would be a rather difficult proposition for any wrongdoer to leave the territory without detection after such a signal had been given. The line of patrol covers about three miles and by aid of this "telephone patrol" two men can cover the ground much more effectively than ten men could without it. All of the telephones are regular long distance sets. Residents of the district are highly pleased with the new system because of the increased protection. They feel safer when they consider that day or night they are in touch with their special officer on a two-minute service.

LOS ANGELES COMPANY ON DIVIDEND PAYING BASIS.

ACCORDING to the July report of the operations of the Home Telephone and Telegraph Company of Los Angeles, Cal., the company already is upon a dividend-paying basis. In July the earnings were $14,560. Expense, including water, light, power and pro rata of taxes and insurance, $4,700; interest on 1,000,000 bonds, 5 per cent., $4,167; 5 per cent. on $1,000,000 stock, $4,167, making a total of $13,034. This leaves a net amount of $1,526.

As shown in a report by the Adams-Phillips company this justifies the statement that already the company can pay dividends. The company has an authorized issue of $3,000,000 stock and $2,500,000 bonds. Of this there has been sold and is outstanding $1,000,000 in bonds and $1,000,000 in stock, leaving in the treasury $2,000,000 in stock and $1,500,000 in bonds.

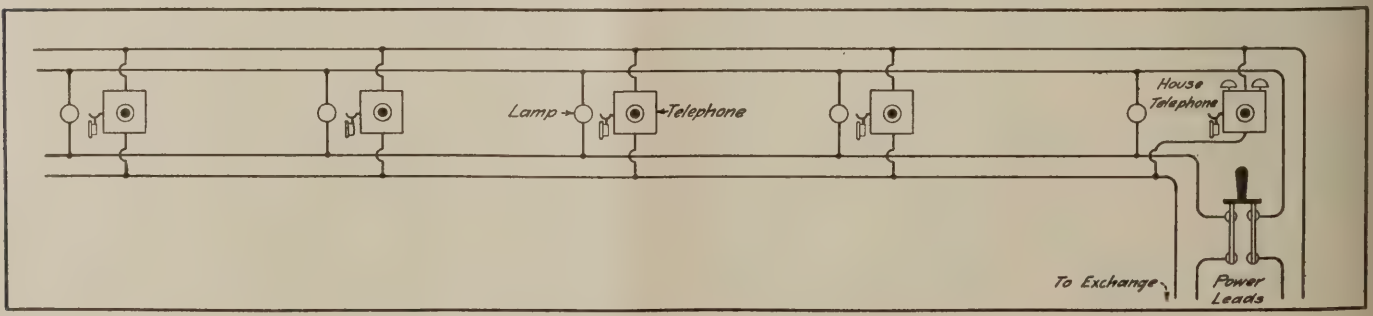
Considering the short time the company has been in operation this report of financial conditions is considered remarkable. It indicates the popularity the company attained at once and is considered ample justification for the outlay that has been made in building a plant first-class in every detail.

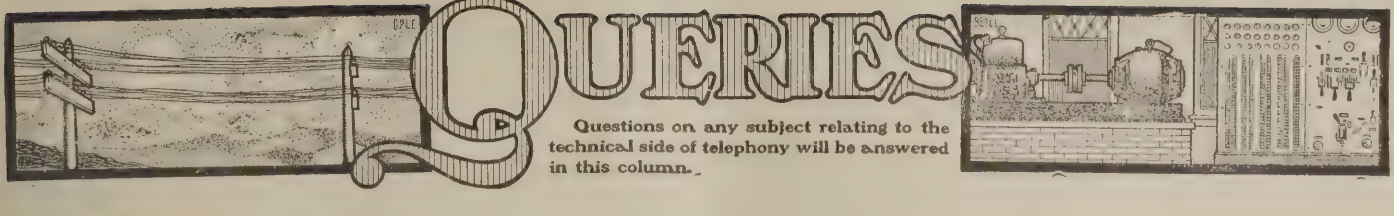
The Adams-Phillips Company say that the rumor of a consolidation of the Home Telephone Company and the Sunset Company is absurd, as there is a pooling agreement of the stockholders of the Home by which they are bound to make no change in the directory for ten years. That the Home Company is in a condition to hold its own, the report to the stockholders proves.

DAMAGES FOR BEING THROWN FROM HORSE.

SCREVEN C. MORTON, Waycross, Ga., is suing the Southern Telephone Company and the Southern Bell Telephone Company for $1,500. He alleges that on March 11th, he was injured by being thrown from his horse after coming in contact with a dead telephone wire which had been carelessly stretched across the street within a few feet of the ground.

Watchman's Patrol Telephone System Installed in Los Angeles, California.





QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

CONNECTING OPERATOR'S SETS OF TWO SWITCHBOARDS.—(167.)

Will you please send me a diagram or instructions as to how to connect the operators' sets of two switchboards so that one operator may handle both boards or they may be separated by a switch for two operators. J. F. R.

Fig. 167 shows one method that might be used for connecting together the operator's sets of your two switchboards. There are a great many ways of doing this, but the one we have given seems as straightforward as any. When the switch is closed the operator's sets are connected, when it is open they are not. The switch shown, may be a double blade baby knife, which can be purchased at any electrical supply house. The wires that you should connect to it you will find connected to all of the listening keys under the key desk. You will find if you can trace them out that one of these wires will go to the secondary of the operator's induction coil and the other will go to one terminal of the operator's receiver. You can try and see if you have made your connections correctly before you make the work permanent. The switch may be mounted at any convenient place on the switchboard. If you use a knife switch, as we have suggested, probably the best place to mount it would be on the front of the switchboards between the two answering jack panels, where either operator could easily reach it. If you wish a neater job than a knife switch would make, you can get a key which can be nicely placed on one of the key desks, from any dealer in telephone supplies by writing and telling him what you want it for.

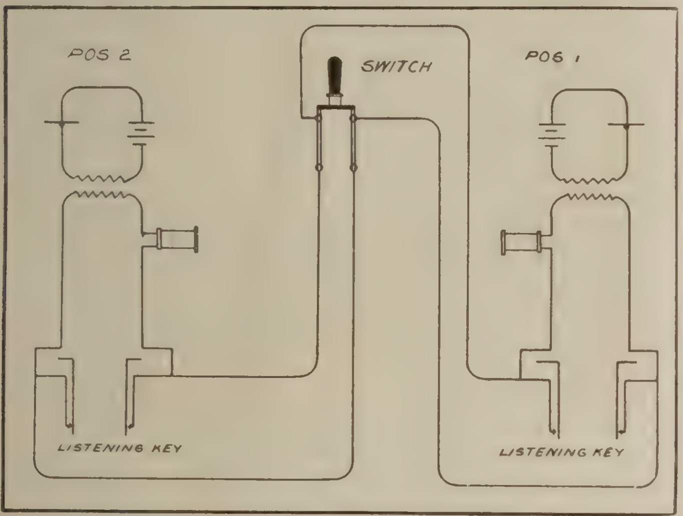


Fig. 167.

RESISTANCE OF TELEPHONE RECEIVER.—(168.)

What is the resistance of the ordinary telephone receiver? A. G. M.

Resistances of receivers vary somewhat. If you will send us the name of the maker of the receiver we can tell you exactly. An average resistance for a receiver is about 100 ohms. Some of the later Bell receivers measure 80 ohms.

ALUMINUM AND COPPER WIRE.—(169.)

What is the resistance of a mile of No. 10 copper wire and what is the resistance of a mile of No. 10 aluminum wire? What would be the diameter of an aluminum wire that would have the same resistance as the copper wire? H. G. N.

We take it that you refer to the B. & S. gauge. The resistance of a mile of No. 10 copper wire at 75° F. is almost exactly 5 1/3 ohms. The resistance of one mile of No. 10 aluminum wire, at the same temperature, is 8.8 ohms. No. 10 copper wire is almost exactly 1/10 of an inch (.102) in diameter. The diameter of an aluminum wire of slightly better conductivity would be slightly over ⅛ of an inch. (No. 8, B. & S., diameter = .128.)

HOME MADE BATTERY TESTER.—(170.)

Can you give me some simple method by means of which I can test my batteries to see if they are run down? H. O. H.

It would be rather difficult to give any cell a reliable test without the proper instrument, but the makeshift here described might be worth the trying. Take an ordinary pocket compass and wrap 2 turns of wire around it, as indicated in the drawing (Fig. 170), being sure to get the turns of wire wrapped in line with the normal position of the compass needle. Connect the two free ends of the wire to the battery and notice the deflection of the compass needle. This should first be done while the cell is new and you are sure that it is in good condition. Later, if you wish to test the cell, you can connect it as before, and if the deflection in this case is less than half of that in the first case the cell is too weak to use. If you are using a sal-ammoniac cell and find the zinc covered with white crystals or a strong odor of ammonia comes from the cell when you take off the cover, you may be sure that the cell is in bad condition and that an entirely new solution is needed.

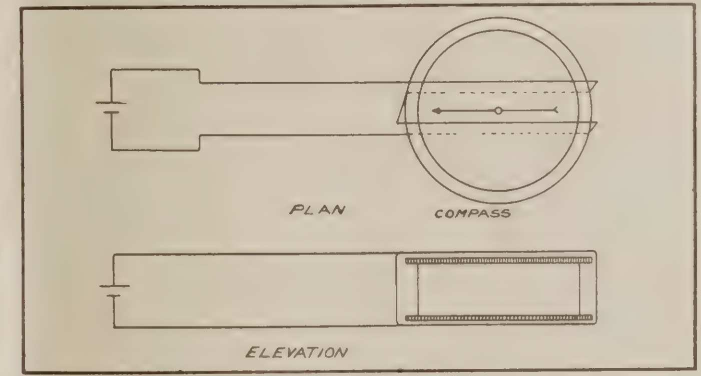


Fig. 170.

IRON ENCLOSED DROP COILS.—(171.)

In the farm line switchboard that we have just put in the drop coils are enclosed in iron cases. Are these put on to protect the coils from lightning? H. M. G.

We do not believe that the enclosure of the coils in the iron cases would have much to do with lightning protection one way or the other. There are two reasons why the coils are so enclosed: First, the iron case makes a very perfect magnetic circuit, and thus increases the strength of the magnet. The principal reason for the use of the enclosed coil is that it prevents cross talk. Iron is a good conductor of magnetic lines of force; very much better than air. Lines of force generated by the magnet when a conversation is carried on, instead of threading through the wires of an adjacent coil, which they might do if the coil was not enclosed, keep in the iron case of the originating coil and thus prevent currents being induced in the second coil.

E. M. F., OF CLARK CELL.—(172.)

Can you give me the electromotive force of the Clark standard cell? A. D. C.

The electromotive force of the Clark standard cell at 15° C., is 1.434 volts. Between the points 10° and 25° C., there is a decrease of .00115 volts for each degree C. (1° C.), rise in temperature.

PATENTS ISSUED

SYSTEM OF ELECTRICAL SIGNALING FOR RAILROADS.

Cyrus Barber, of Keene, New Hampshire, patents (No. 734,655) a system of electrical signaling for railroads. The object of the invention is to provide a system of signaling, by means of which trains entering or leaving a block will signal the block station and also any train that may be in the limits of the block and at the same time enable telephone communication to be held between the trains in the block and the block station. Fig. 1 shows a diagramatic view of the system, Fig. 2 a rear elevation of a locomotive equipped with the invention. Fig. 3 a sectional view of the third rail and conductors, and Fig. 4 a side elevation of the carriage that supports the contact blocks. The third rail is provided with the conductors *13-14* located in insulating pockets on its side. Contact is made with these conductors through the pivoted arms *23* and *24*, which are carried by the carriage. The contact arms are connected by wires to the telephone and bell located in the cab of the locomotive. The blocks are separated from each other. The current conductors are connected at the ends of the blocks by wires *27* and *28*, to a station consisting of a telephone. At points near each of the ends of the blocks are arranged final contacts *29-29*, which form the terminals of circuits including the batteries *30-30*. The arrangement of the circuit is such that when a train enters or leaves the block the station is notified and also notification is given to trains already in the block and telephonic communication can be held between trains and also between the trains and the station. The contact blocks *29* can be varied at the ends of the circuit so that distinctive signals will be given by trains upon entering and leaving the block.

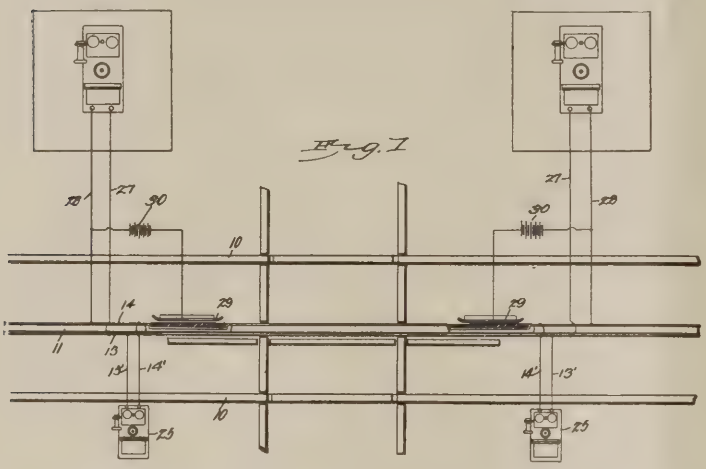


Fig. 1

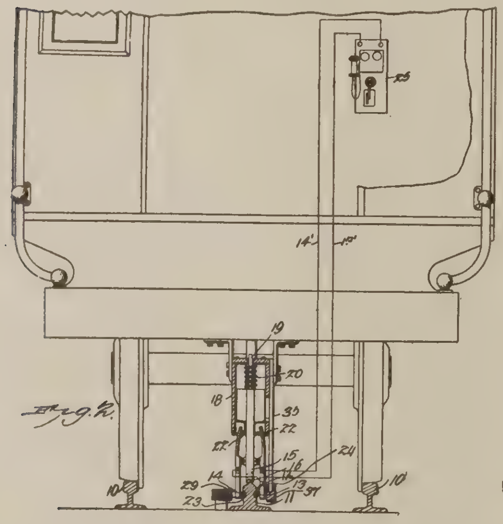


Fig. 2

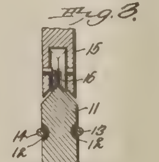


Fig. 3

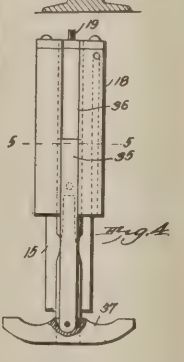


Fig. 4

GALVANIC BATTERY.

David L. Winters, of Chicago, Ill., patents (No. 734,646) a galvanic battery. The object of this invention is to provide a battery to which cells can be readily added or withdrawn without interrupting the circuit. Fig. 1 shows a longitudinal section of the battery, Fig. 2 a plan view and Fig. 3 a view of the positive electrode. The negative element is arranged to be placed inside of the positive electrode and is separated from it by the insulating strips *6*. The contact strips *8* are made of spring metal so arranged that upon the withdrawal of the electrodes they will come together and make the battery circuit continuous. It is evident that the addition or substraction of cells depends upon placing the electrodes in position or withdrawing them.

Fig. 1.

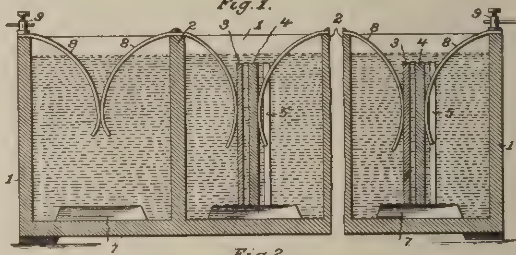
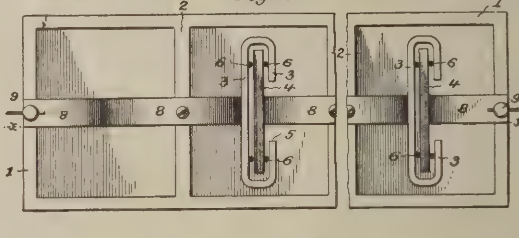
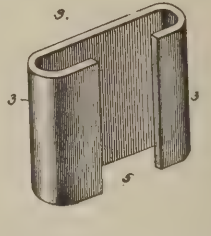


Fig. 2.





GALVANIC BATTERY.

Henry Halsey, of New York, N. Y., patents (No. 734546) a galvanic battery and assigns his patent to the Halsey Electric Generator Company. The object of this invention is to provide a battery having minimum weight and bulk and maximum output Fig. 1 shows a top view, partially in section, of the battery and Fig. 2 a sectional elevation. The battery case is divided by partitions into the required number of cells. Zinc cylinders *5* are conected to the cover *4* and extend down into the excitant solution. The shafts *7* are journaled in the cover and in the bottom of the case and are connected to the carbon cup *5* by the copper spider *11*. A depolarizing agent is placed in the carbon cap. The gears wheels *15* are mounted on the shafts *7* and are rotated by the pinions *16* on the shaft *17*, which is driven by the motor *21*. The zinc elements are connected to the carbon electrode of the adjoining cell by the lug *6* piece *22*, and shaft *7*. The terminals of the battery are the shaft *7* at one end and terminal *6* at the other. The motor is connected in shunt. The switch *28* serves to open the motor and battery circuit. The rotation of the carbon electrodes serves to maintain a uniform solution and at the same time prevents polarization.

Fig. 1

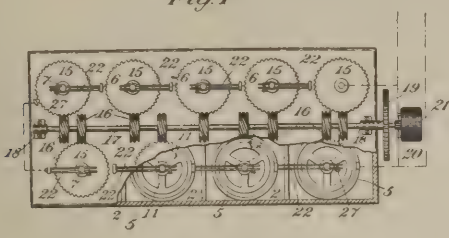
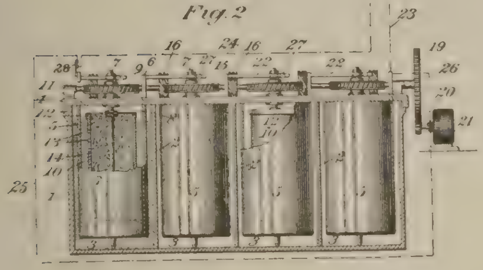
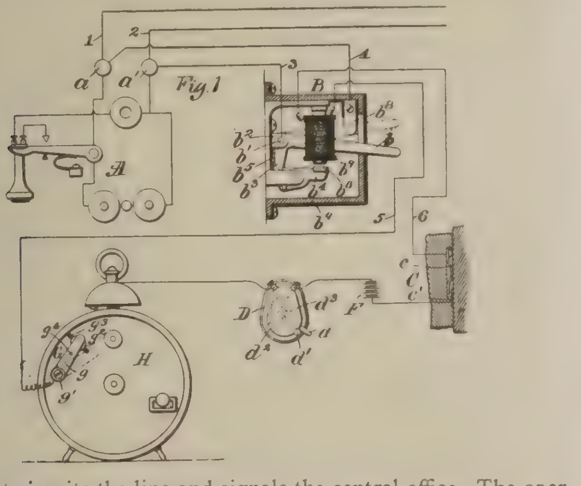


Fig. 2



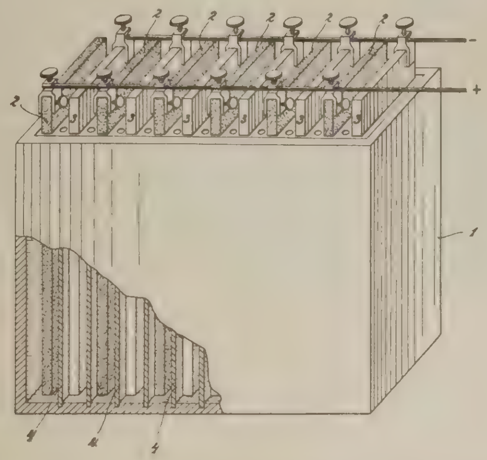
ELECTRICAL BURGLAR ALARM.

Solomon Schwarzschild, of Rochester, New York, patents (No. 734,967) an electric burglar alarm. This invention utilizes the telephone circuit for the transmission of an alarm signal to the central office, upon unauthorized entrance to a building wherein the alarm is located. Fig. 1 shows a diagramatic view of the alarm apparatus and the connection to the terminals of the telephone line. Contact between the springs c-c^1 is made when a door or window is opened and the circuit closed through the magnet B which attracts its armature and releases the arm b^1, which, under the influence of the spring b^5, makes contact with the switch point b^8. This short circuits the line and signals the central office. The operator after answering and receiving no reply, notifies the proper authorities. The local circuit includes a switch D and an alarm clock having a switch G which serves to close the circuit to contact c^1 after allowing sufficient time for the last person to leave the building. The invention is intended for use with central-energy systems.



ELECTRIC BATTERY.

Henry Csanyi, of Felsö-Dobsza, Austria Hungary, patents (No. 734,826) an electric battery. The arrangement of the battery is shown in the figure. The positive electrodes consist of carbon plates and the negative electrodes of zinc plates. The plates are separated by a porous partition *4*. The carbon plate is immersed in a solution of nitric acid of 40° to 50° Baume and the zinc plate in an alcoholic solution of pernitrate of mercury and potassium cyanide. A suitable composition consists of 1,000 grams of 25 per cent. alcohol, 150 grams of 48 per cent. nitric acid, 10 grams of oxide of mercury, and 6 grams of a 60 per cent. solution of potassium cyanide.



STATEMENT OF CUYAHOGA COMPANY.

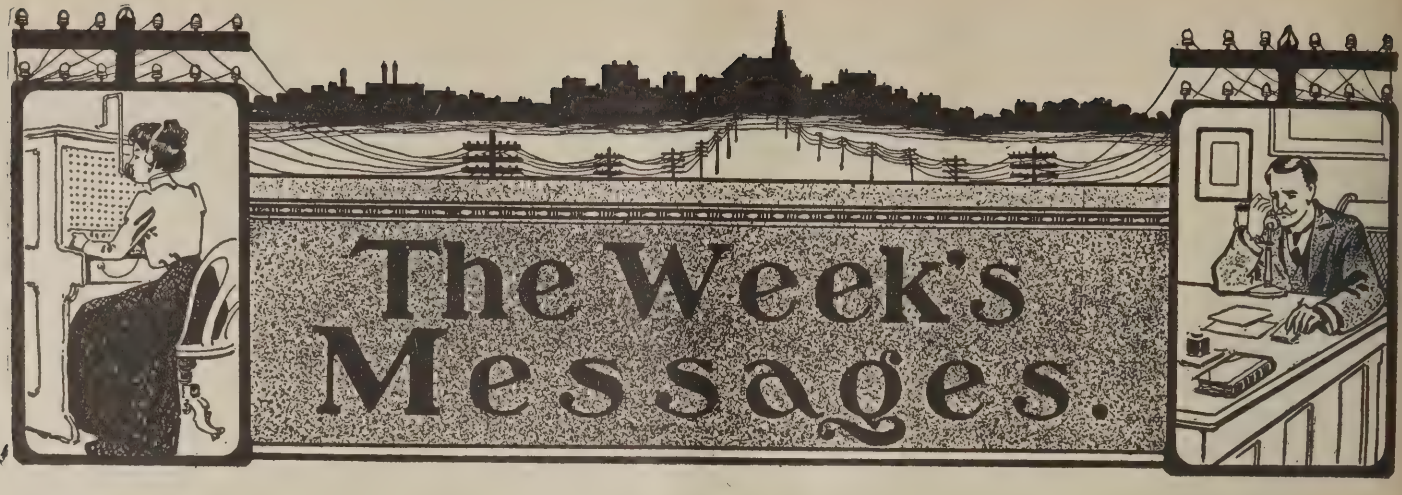
THE following is a statement of the earnings, expenses, fixed charges and surplus for stock of the Cuyahoga Telephone Company, of Cleveland, Ohio, for the six months ending June 30, 1903. This company's earnings will undoubtedly very materially increase with the installation of the new switchboard some time this fall. It is understood that President Dickson will commence an active campaign for new business just as soon as the new switchboard is installed. He expects to lower the residence rates and endeavor in every way to very largely increase the number of residence telephones.

The statement herewith shows a surplus for stock of $38,000 for the six months or on a basis of $75,000 for the year. On January 1, 1903, it will be noticed there was a deficit of $29,000 arising from that period of the company's history when it did not pay all its operating expenses and fixed charges. The statement shows that on the 1st of July the company had a surplus for stock since the start of operations of $7,681. The statement is as follows:

		6 mo., 1903
Gross earnings		$201,565.53
Expenses	$95,360.51	
Taxes	9,606.88	
Expenses and taxes		$104,967.39
Net earnings		$96,598.14
Interest on bonds	$55,825.00	
Interest, miscellaneous	2,290.05	
Total interest		58,115.05
Surplus for period		$38,483.09
Deficit, January 1, 1903		29,142.72
Sundry profit and loss items		1,658.50
		$30,801.22
Surplus, six months		38,483.09
Surplus June 30, 1903, as per balance sheet		$7,681.87

BEES AND LINEMEN.

THE Ottawa, Ill., Home Telephone Company recently had a lively experience with a swarm of bees. A large swarm took up residence in one of their cable boxes and resisted all attempts of the company's linemen to dislodge them. They were finally coaxed into a bucket placed on top of the box by a small boy.



The Week's Messages.

FINANCIAL

NEW BRITAIN, CONN.—The capital stock of the Farmington Valley Telephone Company, of New Britain, has been increased from $10,500 to $27,000.

PLEASANT PLAINS, ILL.—The Boynton Telephone Company, of Pleasant Plains, has increased its capital stock from $10,000 to $30,000.

INDIANAPOLIS, IND.—After three weeks of tabulation the State Tax Commissioners have announced that the aggregate assessment for taxation of telephone property in Indiana, for the year ending with April, 1903, will be $6,819,552, against $5,043,579 for 1902, an increase of $1,765,973.

DES MOINES, IA.—Five thousand dollars has been paid by the officers of the Mutual Telephone Company to County Treasurer Layman, the amount covering the back taxes of the company over which suit was begun some weeks ago.

OBERLIN, KAN.—The Central States Telephone Company, of Oberlin, has increased its capital stock from $20,000 to $60,000. The object of this is to extend the toll lines to the east and south.

PLYMOUTH, MICH.—The Plymouth Telephone Company has increased its capital stock from $2,000 to $20,000. The company, which was organized in April, 1900, has no bonded indebtedness and its officers are: President, A. A. Tafft; vice-president, C. H. Rauch; secretary, E. C. Hough; treasurer, C. A. Fisher. The company has over 125 exchange subscribers.

COMSTOCK, N. Y.—Hon. I. V. Baker, Jr., Charles K. Baker, George C. Baker and others, directors of the Comstock Telephone Company, of Washington County, have filed with the secretary of state a certificate of an increase of capital of the company from $500 to $1,500.

FREMONT, O.—The stockholders of the Fremont Telephone Company will meet on September 8 and increase the capital stock of the company from $60,000 to $100,000. But $15,000 of this stock will be sold to provide for the installing of a new central energy switchboard. This company has no bonds and is very prosperous. It is now earning at the rate of 12 per cent. on its common stock.

WESTFORD, PA.—Westford Independent Telephone Company has increased its capital stock from $1,350 to $6,000.

WOONSOCKET, S. D.—The Woonsocket Telephone Company has declared a 15 per cent. dividend for six months. Owing to the fact that $2,000 was spent this spring in improvements, the semi-annual dividend was passed at the midsummer meeting. The stock of the concern is now worth 200. If business continues as good as it has been it is believed the dividend for the next year will amount to 50 per cent., which will still further increase the market price of the stock. So far the improvements have been made out of the profits, and the company is out of debt.

FRANCHISES

COVINA, CAL.—The Home Telephone Company, of Covina, has secured a franchise to operate in the Azusa valley for thirty years.

WABASH, IND.—City Clerk F. M. McLees has been ordered to notify the Central Union Telephone Company that they must remove all poles, wires and other possessions within the streets of Wabash, by October 1, if they do not obtain a franchise in the intervening time. It is a matter of fact that the business has been dropping off for some time and it is extremely doubtful if the company has any intentions of long continuing local operations.

SIOUX CITY, IA.—The promoters of the Sioux City Telephone Company have obtained petitions from all the wards, thus forcing Mayor Caldwell to call a special election for the people to vote on granting a franchise to the company, which he says will be held September 15.

LEWISTON, ME.—The board of aldermen have voted, 5 to 2, to grant the petition of the Northeastern Telephone Company for the right to enter the city.

AMITYVILLE, L. I., N. Y.—At a meeting of the town board of Babylon, held at Amityville, a franchise was given to D. James Cronk, manager of the New York and Long Island Telephone Company, a competitor of the New York and New Jersey Company, to erect poles on the highway and operate a telephone line between Babylon and Amityville.

WASHINGTON, PA.—The Federal Telephone Company has been granted franchises in the boroughs of Southwest Greensburg and Ludwick.

WYTHEVILLE, VA.—The telphone franchise advertised for sale by the town council has been sold to the Wythe County Mutual Telephone Company, for fifty dollars per year.

ELECTIONS

SHELBYVILLE, IND.—The stockholders of the Mutual Telephone Company have re-elected the following directors: D. B. Wilson, John A. Tinsdall, Dan DePrez, T. C. Fleming and F. C. Sheldon.

GRANVILLE, N. Y.—At the annual meeting of stockholders of the Granville Telephone Company, the following board of directors were chosen: F. E. Hicks, D. D. Woodard, Henry Dillingham, F. T. Pember, E. W. Wyman, M. W. Hicks, W. A. Tenney, F. W. Hewitt, J. H. Collins. At a subsequent meeting of the directors the following officers were elected: President, F. E. Hicks; vice-president, F. T. Pember; secretary, F. W. Hewitt; treasurer, M. W. Hicks. A semi-annual dividend of 3 per cent. was declared. The company has had an increase of 160 telephones during the year and has orders for 100 more, which will be put in as soon as they can be obtained from the factory. Virtually the increase is 260 telephones.

STEBBINS, VA.—The annual meeting of the stockholders of the West Halifax Telephone Company was held at Stebbins recently. E. K. Tune, of Stebbins, was elected chairman of the meeting. The president, Dr. S. T. A. Kent, submitted his report, which was read by the secretary and accepted. The company is in good condition, and at present has connection with Houston, South Boston, Black Walnut and Virgilina. Officers were elected as follows: Dr. S. T. A. Kent, Ingraham, president; W. I. Johnson, Houston, vice-president; W. W. Hankins, Stebbins, secretary and treasurer. Board of Directors—W. H. Bass, L. W. Rice, C. C. Chaney, W. E. Tune, Dr. N. E. McDaniel, H. B. Stebbins and John N. Dickens. C. A. Lacy, manager central office, Houston, and J. E. Thaxton, manager central office at Stebbins.

COMBINATIONS

LATHROP, MO.—The Clover Leaf Telephone Company has passed into the hands of the Clinton County Mutual Company. A bonus of $1,000 is to be paid by the purchasers and an allowance of $250 is to be made for the construction of the plant.

TOLEDO, O.—Announcement is made that the Ashbrooks, H. R., of this city, and Claude, of Cincinnati, have completed negotiations whereby 51 per cent. and the stocks and bonds of the Hamilton Home Telephone Company pass into their control.

BROOKLYN, PA.—A. G. Mack has sold his interest in the Lindaville telephone line to Waldie & Terry, who will put up a metallic circuit line.

DALLAS, TEX.—The Independent telephone lines, known as the Commercial Telegraph and Telephone Company of Texas, have passed into the hands of H. T. Huntington, with Frank B. Smith, the originator of the Independent system of this state, in charge. Mr. Huntington has acquired the system for approximately $400,000 and intends to invest $400,000 in improvements and in extension in Texas and later extend them over the Southwest.

RATES

KNOXVILLE, TENN.—The People's Telephone Company has increased its business rate to $3.00 per month and residence rates to $2.00.

NORFOLK, VA.—After one of the bitterest fights in the history of the councils, the ordinance allowing the Southern States Telephone Company, of Baltimore, to increase its rates in this city was defeated in the council on an effort to pass the measure over the mayor's veto. The ordinance was opposed by the Board of Trade, Business Men's Association, and the Chamber of Commerce.

PERSONAL

FREDERICK P. FISH, president of the American Telephone and Telegraph Company, confirms the report that George M. Cummings has resigned as a vice-president.

B. HASKELL, formerly superintendent of motive power, Pere Marquette, has been appointed general manager of the Franklin Rolling Mill and Foundry Company, Franklin, Pa.

THE WEEK'S MESSAGES—Continued

JAMES S. BRAILEY, JR., general manager of the Central Construction Company, which is installing the conduits and wiring of the Home Telephone Company, of Kansas City, Mo., is in Kansas City. Mr. Brailey anticipates no trouble in having the four exchanges of the company in operation by November 1. Work is progressing satisfactorily on the four buildings to be used as exchanges and on the underground system.

CHARLES CARL, manager of the Home Telephone Company, of Carlisle, Pa., has been given charge of the Mechanicsburg exchange. For some time past this has been under control of the Harrisburg manager.

RAY HERBERT MANSON, traveling engineer of the Kellogg Switchboard and Supply Company, was married on August 3 to Miss Amy B. Arthur, of Toronto, Ontario, Canada, in which city the marriage took place. They will reside in Chicago at 109 North Pine avenue, where they will be at home to their friends after September 7.

WILLIAM M. BURNS, ex-Governor of Idaho, will probably succeed the late Congressman Foerderer as president of the Keystone Telephone Company of Philadelphia, Pa.

UNDERGROUND

BROOKLINE, MASS.—The board granted permission to the New England Telephone and Telegraph Company of Massachusetts to lay and maintain underground conduits and manholes from the conduit on Beacon street to Beaconsfield terrace, and from the conduit on Beacon street to 1853 Beacon street; also a special permit to open said streets for the purpose of constructing underground conduits and manholes.

RUTLAND, VT.—The board passed a resolution to notify the New England Telephone and Telegraph Company, that all their trunk lines on certain streets be laid under ground. The resolution provided that the company be given a hearing at the next regular meeting of the board.

MISCELLANEOUS

TIPTON, IA.—An important special meeting of the D. & T. Telephone Company was held at New Liberty, at which time it was unanimously voted to remove the headquarters of the company to this place. A new 500 drop switchboard has been ordered for the Tipton office to accommodate the growing business here and will be installed as soon as it can be secured.

PONTOTOC, MISS.—The Alabama, Mississippi and Tennessee Telephone Company, of Pontotoc, has filed a complaint with the railroad commission to the effect that the Southwestern Telephone and Telegraph Company is charging a smaller rate than is allowed by law. The offending company has been cited to appear before the commission on the 10th of next month.

FORSYTH, MONT.—Since the district court has appointed a receiver to take charge of the Forsyth-Lame Deer Telephone Company's affairs the reorganizers have secured a majority of the stock and selected a new set of directors, who will assist the receiver in every way possible in straightening out the financial difficulties of the concern. The new directors are Maurice Bentall, Tom Davis, A. C. Wilson, J. C. Clifford and Peter Droese. One of the directors stated that the company would soon have its affairs on a paying basis, as the line was well patronized and that good business management would probably enable the directors to extend the line so that more ranchmen would be able to patronize it.

BELLEFONTAINE, O.—The report published some time ago that the Bell Telephone Company was to secure control of the United Telephone Company of Bellefontaine is said to be untrue. C. E. Yoder, secretary and manager of the company, reports that so far as he knows, the Bell Telephone interests have not been figuring on securing that plant and there is nothing in the rumor that it will be sold out.

MORGANTOWN, W. VA.—Fire caused a loss of several hundred dollars to the People's Telephone Company.

New Construction in the Field

CLARENDON, ARK.—The Clarendon Telephone Company is erecting a telephone line from Clarendon to Keevil

LOS ANGELES, CAL.—The contract for the erection of a two-story brick building in Santa Ana, for the Home Telephone Company, has been let to Kuechel & Black for about $13,000.

MACON, GA.—After looking over the situation in Macon for the establishment of a new telephone system, Harry H. Stearn, of New York; William A. Collins, of St. Louis, and Henri Yuller, of Philadelphia, will consult with their associates relative to the new enterprise. It is their intention, if the deal is consummated, to establish systems in the towns in the vicinity of Macon and eventually extend their lines over the entire state. Mr. Collins expects to return to Macon the latter part of this month.

KEWANEE, ILL.—The first out-door work of the Kewanee Home Telephone Company is being done. The company has begun putting in its underground wires in the business district. The work here is under the direction of Superintendent of Construction Phillips.

MUNCIE, IND.—The Delaware and Madison Counties Telephone Company has made an arrangement by which it may furnish telephone service to Selma and vicinity. The arrangement is the result of an agreement which has been made between Superintendent Bromley of the D. & M. Company and L. S. Sparks, Elden Cannaday and others, representing the Independent lines of Selma and vicinity.

LINTON, IND.—The new Home Telephone Company has let the contract for the entire reconstruction of its plant in this city, and will erect its own exchange building.

ATLANTIC, IA.—Musson Bros. are erecting a telephone line south of the city.

DES MOINES, IA.—The Mutual Telephone Company directors have decided to attempt the purchase of a $95,000 multiple switchboard. They have not decided upon any plan for raising money to make the improvements contemplated. The plan which F. M. Hubbell suggested was for 600 stockholders to purchase $200 worth of service at the present rates and preserving the mutuality of the company till the service paid for should be had at least.

MONTROSE, IA.—J. G. Sanders, manager of the German-American Telephone Company, has completed arrangements with Dr. Buck to put in a central here. Fifteen subscribers have been secured already for the exchange which will be established here, who will have direct connection with Galland, Charleston, Donnelison, LaCrew, Mt. Hamill, Houghton, Cottonwood, Hillsboro, Salem, Pilot Grove, St. Paul, West Point and Lowell.

CHANUTE, KAN.—Wareham & Woods, owners of the Chanute Telephone Company, are installing a new section to their switchboard, which will give them 600 capacity.

OSWEGO, KAN.—The Farmers Mutual Telephone Company, of Oswego, has ordered a new 200 line switchboard to replace the 100 line board it now has. It has a franchise for a telephone system at Edna, Kan., and will move the old switchboard to that point.

MADELIA, MINN.—At a meeting of the directors of the Madelia Telephone Company the contract for the construction of the company's lines was let to Contractor Dibble, of Fairmont. This work includes the erecting of poles, stringing wire, putting in a switchboard and instruments and all the work of installing the plant. Messrs. White and Thompson, representing the Willow Creek Telephone Company, with headquarters at Vernon Center, have made arrangements with the local company for connections.

CARROLLTON, MO.—The Missouri Valley Telephone Company is setting poles on the road to Miami. It will erect a steel tower for the river span.

CARLETON, MONT.—T. A. McClain, a rancher and fruit grower of Carleton, has started a movement to organize a stock company to build a telephone system throughout the Bitter Root for the benefit of the farmers and ranchers.

WILBER, NEB.—The local exchange of the Salina Telephone Company has been opened for business with about eighty instruments connected.

ALBANY, N. Y.—The Long Distance Telephone Company of New York State is making rapid progress in the building of its line from Albany to Buffalo, and when this is completed it will give all the Independent companies in the state western connections through Ohio, Indiana and Illinois.

ANGELICA, N. Y.—The Angelica Telephone Company has completed three new branches to its systems, one to West Almond, another to Birdsall, and another to Jersey Hill, adding about 100 subscribers to the list.

COOPERSTOWN, N. Y.—Mr. Ward, who conducts an Independent exchange at Cooperstown, as well as one at Richfield Springs, is stringing copper circuit wires from Richfield Springs to Paines Hollow, at which point they connect with the Utica Home Telephone circuits.

FLINT, N. Y.—Wires are being strung through this place for the Seneca-Gorham Telephone Company, the poles for which have been standing some time. This is an Independent line with central at Stanley, and will connect most of the farms in the two towns.

ITHACA, N. Y.—Manager Irving B. Whiting, of the Ithaca Telephone Company, states that the line connecting the Ithaca system with that of the line of the Brookton and Slaterville Telephone Company has been completed and is ready for use. The line to Danby is being hurried to completion. John Van Ostrand, who is installing a telephone station at Danby, states that he already has more than forty-five subscribers.

LOWVILLE, N. Y.—The Black River Independent Telephone Company is stringing No. 10 copper circuits from Lowville to Watertown, and later will make connections with the Utica Independent Company.

UTICA, N. Y.—Edward L. Cline, superintendent of construction of the Utica Home Telephone Company, announces that the company's long distance lines to Little Falls, Herkimer, Mohawk, Ilion, Frankfort, Rome, New

THE WEEK'S MESSAGES—Concluded.

Berlin, Waterville and Clinton are completed. The company has over 1,900 working telephones, and the contracts for new telephones are being written at the rate of fifteen a week. On April 1st, 7,537 calls were received, and on August 3d, 20,431 were received. These figures show the growth of the service.

TRADE NOTES

The Franklin Rolling Mill and Foundry Company, of Franklin, Pa., has secured the services of Mr. B. Haskell as General Manager. Mr. Haskell was formerly Superintendent of Motive Power at Pere Marquette. This company is the manufacturer of the Tripartite Steel Pole.

The Eureka Electric Company has just closed a contract with the Davenport & Tipton Independent Telephone Company, of Tipton, Iowa, for a 480 line express switchboard, in four positions, embodying their flashlight transfer and flashlight clearing-out systems; also a chief operator's desk toll line switchboard of 50 line capacity.

The Swedish-American Telephone Company, of 88-90-92 West Jackson Boulevard, Chicago, Ill., whose advertisement appears on another page of this issue, has recently contracted with some of the large steamship companies for the complete installation of telephone exchanges in the different steamers. It is stated that telephones of the central energy type will be placed in each state room. These will enable the passengers to communicate with any part of the vessel. This feature will undoubtedly be highly appreciated by the travelling public.

Telephone Manufacturing Companies are asked to take notice that the attention of prospective exhibitors at the Louisiana Purchase Exposition to be held at St. Louis, is called to the fact that the exposition will be open on the 30th day of April, 1904, and it is therefore desirable that all companies who wish to exhibit should have their applications in at once, in order that they may be properly provided for. W. E. Goldsborough, Chief of the Department of Electricity, announces that the Electrical Building stands completed except for the sculptural decoration in the way of groups of statuary which will surmount the six towers and the other pedestals.

The Chicago Tie, Pole and Post Company, of the Auditorium Annex, Chicago, is the name of a new concern started, on his own account, by Millard Hopkins, who was formerly Vice-President of the A. P. Hopkins Company, producers of cedar poles, Escanaba, Mich. The company has been formed for handling railway ties, telephone and telegraph poles and fence posts. The organization includes, in addition to Mr. Hopkins, men of long experience in these lines, and the company is said to have ample capital to conduct a successful business. Since July 1st the company has come in control of large stocks of poles, and posts, which has enabled it to fill orders promptly. Mr. Hopkins is manager of the company and has charge of the sales. He is at present making his headquarters at the Auditorium Annex, Chicago, until general offices can be established.

The Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., and Chicago, Ill., has recently sold a switchboard and an entire exchange equipment to the Lewiston Telephone Exchange Company, of Lewiston, Minn. They have also sold additional switchboard apparatus to the Minot Light & Telephone Co., of Minot, N. D. This company has furnished the following equipments to independent telephone companies: A two-position toll line board, equipped with selective lockout and toll line apparatus, to the Citizens Telephone Company, of Mankato, Minn.; an entire switchboard equipment to the Madelia Telephone Company, of Madelia, Minn.; twenty selective lockout telephone equipments to the Independent Telephone Company, of Winthrop, Minn., and a quantity of telephones to the Farmers' Mutual Telephone Co., of Volga, So. Dakota.

PLANTS FOR SALE

Advertisements under this head $1.00 *for 25 words or less for each insertion. Prepaid.*

TELEPHONE EXCHANGES—Two first-class telephone exchanges for sale. One 180, the other 200 telephones. Also 20 miles of metallic and 30 miles of grounded toll line. All standard construction and in first-class condition. Net income over $4,000 per year. Price, $15,000 cash or good paper. No trades considered. Address UNITED TELEPHONE CO., Malden, Mo.

FOR SALE—For $3,000, if taken at once, telephone system of 650 subscribers, paying 30 per cent. and still increasing. Good long distance connection. The company owns toll lines through three county seats and several other towns. If you are in the market and mean business, write us by return mail. We must close out in 30 days. Some one will get a snap. Sixty-three miles of line will reach Omaha and Council Bluffs, with good long distance connections through Nebraska. This ad. will appear but once. Take advantage of it now. Address Box 944, Corning, Iowa.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

EXCHANGE WANTED—Would like to purchase a telephone exchange in a good live town; one in the West preferred. Writer would accept a position as manager of an exchange. Address BOX 63, The American Telephone Journal.

POSITION.—At liberty after Sept. 1, a competent telephone man. Want position as manager. State salary you can pay and what you want for your money. Address M. L. GAY, Union City, Ind.

POSITION—Competent telephone man desires position; six years' experience in both inside and outside work. Thoroughly understands common battery and magneto systems. Best of references. Address BOX 60, care The American Telephone Journal, New York.

SALESMAN—Wanted, experienced telephone and switchboard salesman. One with established Northwestern trade preferred. No applications considered except those giving full particulars. Address BOX 65, The American Telephone Journal, New York.

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau street, New York City.

FOREMAN wanted to take full charge assembling and instrument wiring department in telephone factory in an Eastern city. Must have good experience and be able to comprehend diagrams. Experience in switchboard and central energy equipment desirable, but not positively necessary. Address Box 42A, care The American Telephone Journal, 116 Nassau street, New York.

GENERAL FOREMAN wanted to take full charge of all departments in telephone factory making complete line of switchboards for both magneto and common battery systems, also complete line of telephone instruments for exchange and intercommunicating systems. Must have good experience in similar position. Location an Eastern city. Address Box 74, care The American Telephone Journal, 116 Nassau street, New York.

The American Telephone Journal

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VOLUME VIII *SATURDAY, AUGUST 22, 1903* *NUMBER 8*

TELEPHONE METHODS IN EUROPE

By Klas Weman.

METHODS of conducting the telephone business in this country and in Europe are noticeably different, not only because the government or a municipality has taken it in hand, which is the case in a great many European instances, but the methods of management are strikingly different as well as the outside construction and the way in which the rates are calculated. Take, for instance, a private telephone company having twelve to fifteen hundred connected subscribers in a European town. We find there, as a rule, the administration consists of a manager in charge, and his staff; an engineer, responsible for the switchboard, subscribers' instruments and the repair shop; and a second engineer, whose duty it is to take care of the outside construction. Each of these technical men has an assistant or a foreman and some workmen. Beside these, there is a cashier and bookkeeper.

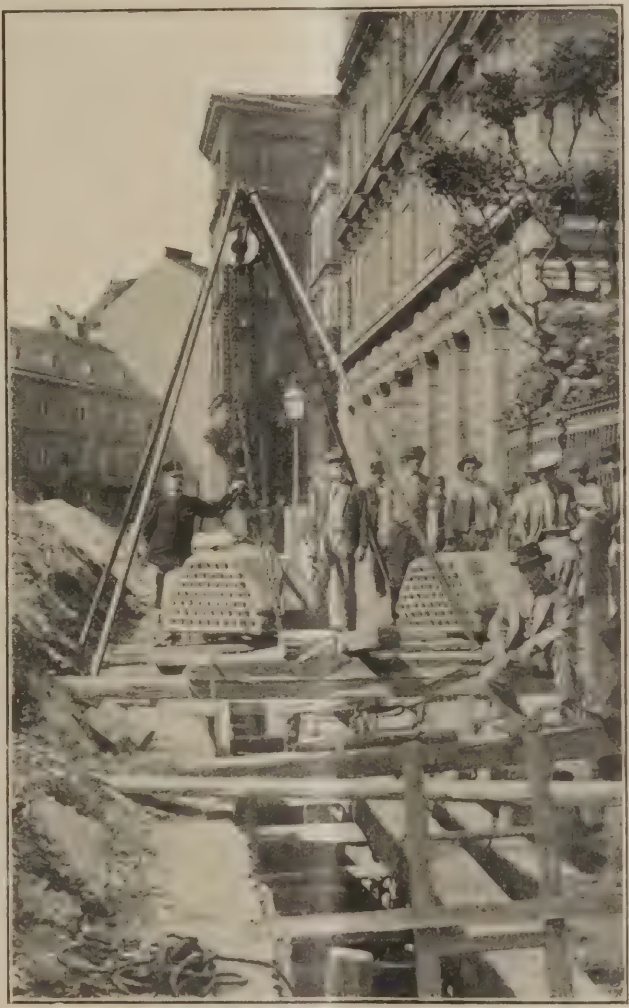


Fig. 1. A Cement Block Conduit Under Construction, a Section of the Conduit Being Lowered Into the Trench.

The inside staff does all the testing, if the company has no special testing department. In that case, this department makes all the tests, and sends out trouble men to remedy the faults on the line as well as the subscribers' instruments. Otherwise, the outside and inside departments take care of their own territory. Against this formidable staff we have, for a system of similar size, the American telephone manager. He is supposed to take the combined work of the manager, inside engineer, outside engineer, and sometimes bookkeeper and cashier. The manager has an outside gang, and, generally, an all around man as assistant, but that is all. It is doubtful whether he is able to give sufficient time to each of these departments to conduct the business with the same efficiency as the combined force of the European company, and of necessity something must be neglected or else only temporarily repaired, otherwise, the manager must take the night hours for office work. Hats off to the manager who is able to alone fill all these positions satisfactorily, particularly when we know that his salary is often out of proportion to his work.

As a rule, the company's prestige is greater in Europe than in America. There is always a very specific contract signed between the company and the subscriber, setting forth the rights and duties of both parties, and the company takes great care to so word the contract that it is protected against unreasonable demands on the part of the subscribers. The private companies generally endeavor to satisfy their subscribers by giving as good service as possible, knowing well the disastrous results of a rate war with a possible competitor. The shareholders are satisfied with a reasonable and steady dividend, and as a capable manager always is able to make a telephone system a paying and growing success, more attention is paid to the improvement of the service and construction than to increasing the dividends. An important factor is the quality of apparatus and material used. Not only trouble, but great expense, is saved by always using the best. Cheap goods find no market, and even the smallest

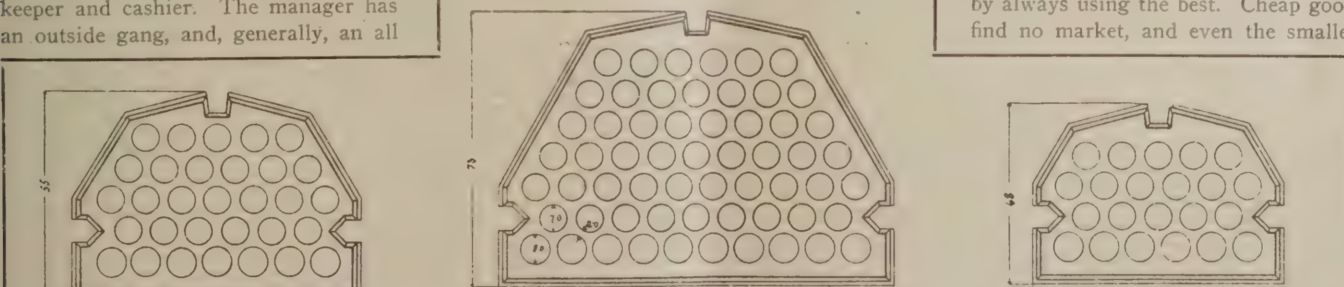


Fig. 2. Cross Sections of Three Different Types of Cement Block Conduit, 31, 59 and 22 Duct. The Block of Concrete on Which a Joint Rests is Shown Below the Blocks.

beginners realize that the wisest policy is to follow the high-grade idea throughout. The American companies are gradually finding this out, to their advantage, but many of them must still keep up a dying existence because their maintenance of cheap and poor material, used at the start, is swamping them.

If we turn to outside construction, we find that, with few exceptions, the aerial lines are carried over the roofs on more or less ornamentally constructed iron standards. The inhabitants object to poles on the streets, and, if they are used to any extent, as, for instance, in Holland and Belgium, they have to be constructed of iron and made to look ornamental. In England, where the right of way on buildings is very hard to procure, the National Telephone Co. very frequently uses poles, but they are far from ornamental. In the northern countries we find, as a rule, perfectly constructed roof-standards made of angular or U-iron. This kind of construction was necessary before the bulk of the wires were put underground, on account of the heavy snow and sleet storms. Germany, especially, has used tubular iron extensively for this kind of construction, with very unfavorable results during occasional snow storms.

KIND OF SUBSCRIBERS	KIND OF TELEPHONES	RATE CLASS	ANNUAL SUBSCRIPTION	CONNECTION TO	
				CITY SUBSCRIBERS	RURAL SUBSCRIBERS
City Subscribers	Private A	1	$27.00	Free	According to distance
	Business A	2	$32.00	Free	
	Restaurants and Hotels	3	$48.00	Free	
	Paying for each call B	5	$14.00	1.1c.	
Special (*) Star Subscribers	Private	7	$40 00	Free	300 calls per annum free; over this, 4c. per call.
	Business	8	$40.00	Free	
	Restaurants and Hotels	9	$57.00	Free	
				Rural Subscribers within 10 miles	City and Rural Subscribers within 10 miles
Rural Subscribers A		4	$14.00	Free	According to distance
Rural Subscribers B		6	$5.00	0.85c.	
(*) Star		10	$34.00	Free	600 calls per annum free; over this, 4c. per call.

* A deposit of $13.00 required from these subscribers.

Fig. 3. Table Showing Classification of Subscribers in Copenhagen.

Nearly all large cities now have their wires placed in conduits. In this kind of construction, the methods also differ considerably. Instead of using the vitrified clay conduits so common in America, we find that the "Hultman System," or variations thereof, is used almost exclusively. A block of cement is formed with as many holes as desired for the route, and this takes the place of the clay pipes. These blocks are made with from three to fifty holes and vary in length from three to five feet. The accompanying illustration will give an idea of their appearance. The joints rest on U-formed pieces of concrete. In the grooves at the sides and at the top are placed square iron bars along the entire length of the route. Along the edges of one end of the block is a groove, and on the other end a ridge, so that when placed in position, the ridge will fit in the corresponding groove on the next block. The ends of the blocks are somewhat reduced in size. When all is in place, all the grooves and joints are filled with cement. If it is necessary to make the blocks waterproof, they are given a heavy coating of asphalt tar. The manholes are, of late, made in sections of concrete, each section having a groove and a ridge at the ends, similar to the blocks. The bottom is made of concrete and the sections are then simply placed one on top of the other, and the joints filled with cement. The top is built in the regular fashion.

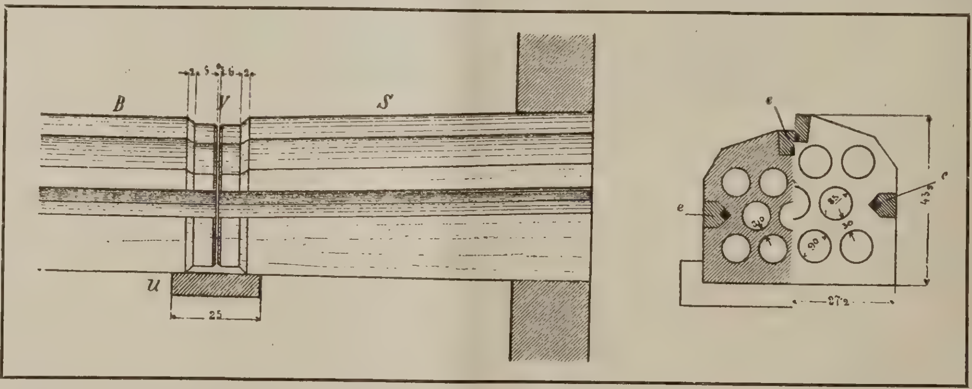


Fig. 4. Side View of Block Conduit Entering a Manhole, Showing a Joint Resting on the Concrete Supporting Block. To the Right is a Cross Section of the Same, Showing the Square Iron Rods (the black squares) Imbedded in Cement—Which Fills the Grooves.

Regarding the classification of the subscribers in the larger systems, the following table gives an idea as to the system employed by the Copenhagen Company. This company has 19,000 subscribers, about 12,000 of which are directly connected with the main exchange. The Copenhagen Company, by the way, bought out the International Bell Company, with its 22 subscribers, in 1881, and has been one of the most seuccessful in Northern Europe. The capital, itself, has 300,000 inhabitants, and the company covers a territory having a diameter of 72 miles. The subscribers are first divided into two classes—city and rural. Then into three sub-classes — "A," "B," and "Special," or * (star) subscribers, and finally into ten rate classes. The "A" subscribers pay a fixed sum annually for an unlimited number of connections. Toll connections are charged for according to distance, varying from 2c. to 8c. for three minutes' conversation. The "B" subscribers pay for each call. In the city 1.1c. per call is charged, and for toll service 2c. to 8c. for a three minute period, according to distance. Subscribers connected to rural exchanges are charged 0.83c. per call, and the same toll rates as city subscribers. A deposit of $15.00, however, is required from all "B" subscribers. The "Star" subscribers in the city are allowed an unlimited number of city calls for an annual fixed sum, and 300 free toll connections, but over this they are charged 4c. per toll connection. "Star" subscribers connected with rural exchanges pay a certain amount per annum for an unlimited service within ten miles. 600 toll calls are allowed free; over this is charged 4c. per toll connection. The capital of the company is $1,350,000, on which is paid almost regularly 6 per cent. dividend, and 5 per cent. is put to reserve funds.

If we now go on to Holland and stop at Amsterdam, which has 550,000 inhabitants, we find that the municipality for seven years has conducted the telephone business, and is now able to show about 5,000 subscribers on their list. The capital invested in this plant amounts to $813,600.00. A prospective subscriber here must pay, before the contract is signed, an entrance fee of $10.00 and an annual subscription of $36.00 for unlimited service. The Interurban lines are owned and run by the Government, and toll service is charged for, according to distance, varying between 25c. and 50c. for three minutes' conversation. The expenses, divided among the subscribers per annum, are calculated at $26.00 per subscriber. Income per subscriber per annum amounts to $43.70. The net profit goes to reserve and renewal funds. Most of the cables are placed underground and the apparatus and construction are the best.

The Helsingfors Telephone Association, in Finland, for a system of its size, gives the cheapest service in the world. The city has 80,000 inhabitants, and the Association, at the beginning of this year, had 4,145 connected subscribers. The peculiar feature of this system is that the subscribers are members of the Association. It started in opposition to the older company and finally succeeded, buying the old company out in 1901. The subscribers of the old company are all connected with the Association exchange, and the company is managed by the Association which controls it. The annual rate for the company subscribers is $30.00. A member of the Association pays the cost of his line and buys his instrument from the Association, paying, after this, an annual sum agreed upon at the meeting of the members. For 1902, the actual cost of maintenance was $10.00 per member line, and the annual fee was then, according to the Articles of Association, fixed at $12.00 for 1903, or 20 per cent. added. This gives the inhabitant the choice between a membership and a subscription. The average expense per subscriber, last year, was $13.25. The income per subscriber was $16.70, giving a net profit of 4 per cent. on their capital of $368,000. At present, all the wires are being placed underground.

Regarding modern exchange equipments, Europe is still behind. conservatism has, in many cases, retarded the use of common battery equipment, and many companies have, therefore, been saved the experience of Independent American companies who allowed the manufacturers to experiment with their apparatus at the companies' expense. Europe has followed the development of this system with keen interest, and will adopt it, having the benefit of the experiments made in America. Recent common battery installations are to be found in Buda Pest (Western Electric); London (Kellogg); Brussels (Western Electric); Hague (Ericsson); Moscow (Ericsson); Warsaw (Ericsson). Vienna has a Western Electric Lamp calling board.

HOW TO EDIT A NEWSPAPER TELEPHONICALLY

By Omar D. Gray, *Editor of The Sturgeon Missouri Leader.*

THE telephone assists Mr. Gray very materially in securing all of the county news items, and he is able to get them right to the hour of going to press, which he would be unable to do without the telephone.

I WANT to say first that I became interested in a telephone system because I thought it would help me secure all the county news, and I was not disappointed in the results. The results I obtain can be secured by other publishers, even though they are not financially interested in their home telephone system.

I will discuss the matter of gathering county news over the telephone lines briefly: It is a simple matter apparently, but it requires persistency. When you start at it, keep it up. To gather news over the telephone successfully means that one should be well acquainted with those who rent telephones. This accomplished, you must be sure your ear is tuned right. It is hard to get initials right over the telephone. It is embarrassing to ask one to repeat many times—that is, it is embarrassing to me, but I may be overmodest. I edit a weekly paper and am interested in a telephone system.

I do not bother the 400 farmers on these lines until Tuesday night of each week or on Wednesday morning. I have the operator ring ten short rings on one line, begining at No. 1. Understand that on these lines referred to there are from ten to fifteen telephones. When the subscribers hear the ten short rings they know instantly that the *Sturgeon Leader* wishes to talk to them, and all who hear the rings take down the receivers. I tell them the *Leader* is depending upon them to give the news. I first ask for the names of the sick. I inquire if there are any deaths, marriages, births, murders, suicides, accidents, real estate transfers, church notes, etc. I repeat these questions on more than thirty lines. After I have finished with each the subscribers demand that I tell them something. If anything of importance has happened I tell them. "Fair exchange is no robbery."

When gathering news this way I am generally seated at my desk in my office or residence. I have a desk set at each place, and while my left hand holds the receiver my right is free to take the notes. Not being a shorthand man, I have to write the items out immediately after I have said good-by to all, as generally I have to pen the lines hurriedly, and I cannot risk losing the trend of matters. Sometimes I get enough news over one line to make a special letter from that neighborhood.

The country editor should keep in touch over the telephone with all renters of these instruments in his locality. If you will study out a system and persist in your efforts you will soon train your friends to call you up when anything has happened that they think worthy of space in your paper.

When I commenced gathering news in this way there were many telephone renters who were not subscribers to my paper. This programme of mine served to advertise the paper to those who heard the conversations, but who were not readers of the *Leader*, and so by and by they came in, one by one, and enrolled their names. Now fully 390 of the 400 telephone renters on this system are subscribers of my paper. And then all this leads to increased business along other lines. They become educated and telephone you their want ads. and give you orders for sale and picnic bills and stationery.

Every Thursday morning before going to press I ask the operator to ring the farmers once more. I ask for late items, and then before ringing off I tell them that the *Leader* will go to press at 2 o'clock and if anything of importance happens to be sure to notify me. And in this way I have 400 families watching for me.

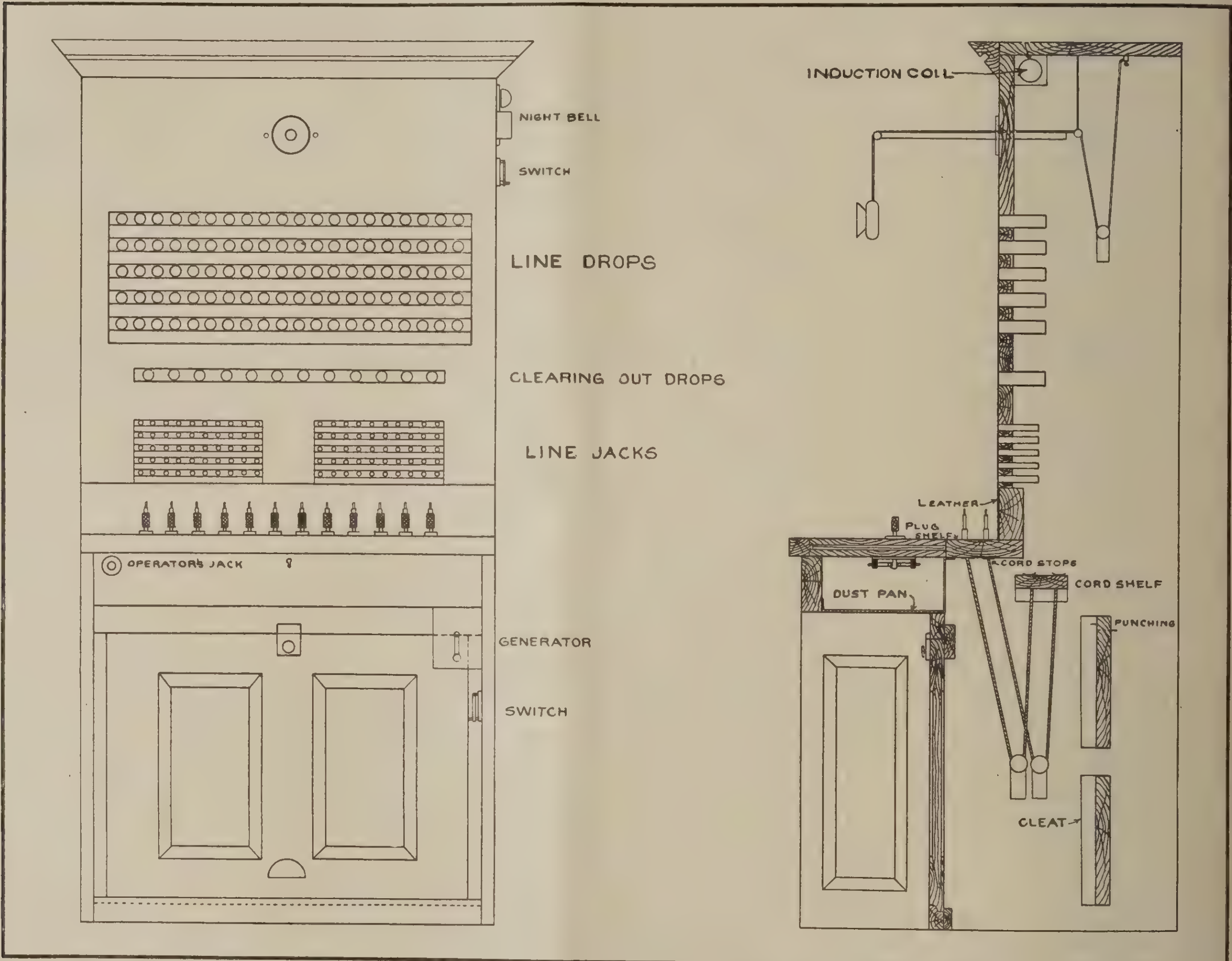
Do not omit any news items given you over the telephone. If you do, the parties concerned will not take the pains to serve you again. If you have never tried this method of news gathering I recommend that you begin at once. You will make friends in this manner for your paper, and you know friends make business, and business makes you money.

CONSTRUCTION OF A MAGNETO SWITCHBOARD

By A. Dallam O'Brien.

THE advantages, accruing to a small telephone system, from a careful consideration of the details of its construction and equipment, fully warrant the expenditure of considerable time and labor in its design. In laying out a system, it will almost invariably be found advisable to make provision for future growth at the outset and to provide sufficient room, in the central office, to accommodate such additions to the switchboard as future requirements may dictate, and at the same time allow for the installation of additional terminal facilities and power machinery. The switchboard should be of such a type that additional sections can be readily added and while, in the case which we will consider, a multiple board would probably not be justifiable, some means must be provided for the interconnection of the sections. This result is readily obtained by the use of local trunks.

In the present instance a central office containing a one hundred line, one position, one section switchboard, having an ultimate capacity of three such sections or 300 subscribers' lines, will be considered. The switchboard which will be described is of the magneto type, and is equipped with magnetic ring-down line and clearing out drops. There is no battery in the connecting cord circuit, the current for each subscriber's transmitter being furnished by local batteries located at the sub-stations. Fig. 1 shows a front elevation and a central, vertical section through a 100 line section of a switchboard of this type. The board is built of polished oak or mahogany, as the conditions require. The equipment of the board consists of 100 line drops and 100 line jacks, and 12 connecting cord circuits, each circuit consisting of a pair of cords and plugs, one clearing out drop and one combined ringing and listening key. In addition, the equipment necessary for the operator's telephone set is provided, which consists of a transmitter and receiver, with cord and plug, a receiver jack and an adjustable transmitter arm and mounting plate.



Front Elevation and Vertical Section of a Small Magneto Switchboard. Capacity 100 Lines.

The front panel below the key board, which is provided with a catch, as shown in the drawing, is thus made removable to furnish ready means of access to the front of the connecting rack. The plug shelf and the face of the board, for a space of 3 inches above the plug shelf, are faced with 1/8 inch leather, which is stained to match the color of the wood-work and which prevents the scratching and nicking of the board due to the impact of the plugs, which, after having been withdrawn from the jacks, are allowed to fall into their sockets. The plug shelf is drilled to receive the plugs, and to its under face are fastened brass stops provided with leather washers, which serve to prevent the plugs from falling through the shelf.

The connecting rack is made of 1 inch maple and extends entirely across the board, and is fastened by means of cleats screwed to the sides of the switchboard. The rack is made in two parts, as shown in the drawing, the lower half is equipped with terminals, to which are connected the subscribers' lines coming to the switchboard. The upper half is in like manner equipped, and to these terminals are soldered the wires leading to the jacks. The terminals used on the connecting rack are punched from thin sheet brass and are shaped, as shown, so that they protrude through holes drilled in the rack, thus making it possible to connect to the terminals on both sides.

The subscribers' lines, which come into the switchboard, and the lines which lead to the jacks, are connected to the side of the rack nearest the front of the board. The back face of the rack is utilized for cross connecting the incoming subscribers' lines to the jacks. The necessity for being able to transfer a subscriber's line from one jack to another by a change in the cross-connection, will not be very apparent where the office equipment consists of but one section of switchboard and the importance of the divided rack will not be felt until additional equipment is installed. When this occurs, the ease with which the lines may be distributed among the sections and the operators' loads equalized, by changing the cross connections, will make the usefulness of the method apparent. The line drops are mounted on iron mountings, 1 inch wide, ⅛ of an inch thick, and 28 inches long, each mounting containing 20 drops on 1⅜ inch centres. Between each two strips of drops, when they are mounted in the board, is placed an ebonite strip 1 inch wide, in order that the operator may have sufficient room to restore any drop without danger of disturbing the drops in the strip below. The clearing-out drops are mounted on one strip below the line drops, as shown in the drawing, and are placed on 2 inch centres on the mounting. The line jacks are set into the board in two panels, each panel containing 5 strips of 10 jacks each. The jacks are on 1 inch centres, and ½ inch ebonite spacers are used between the jack strips. As the jack strips are ½ inch thick, it is evident that the jacks are mounted on 1 inch horizontal and vertical centres, which allows sufficient room between adjacent jacks to enable plugs to be inserted and be withdrawn without difficulty.

The key board equipment consists of 12 combination ringing and listening keys, which are mounted on 2 inch centres opposite the cord circuits to which they belong. With this type of key it is possible to ring out only over one cord, and consequently in this switchboard it is necessary to use one cord for answering and the other for calling purposes. Following the usual and natural practice, the ringing key is connected to the back cord, which makes that the calling cord. The interior of the key board is protected from dirt and dust by means of a dust pan, shown in the drawing, made of No. 16 sheet iron. The operator's transmitter is provided with a sliding arm, cords and weights which pass over the pulleys shown, which enable the position of the transmitter to be adjusted. The terminals of the transmitter cords are connected to the binding posts, shown in the top of the board, and the wiring to the induction coil, batteries, and receiver jack is carried from this point.

The key board wiring, wiring to the jacks from the connecting rack, from the jacks to the line drops and from the cord shelf to the clearing out drops, is all done with No. 22 silk and cotton covered switchboard wire formed up into cables and served with waxed twine.

The operator's induction coil is mounted in the board, as shown. One side of the primary winding is connected to one of the transmitter binding posts and taken through the transmitter cord to the transmitter. The other side of the primary is connected to a contact in the operator's receiver jack, a wire being run from the opposite contact of the receiver jack to a terminal on the lower half of the connecting rack. This terminal is connected to one pole of the transmitter battery.

One other terminal is provided on the rack, to which is connected the other pole of the transmitter battery and from which a wire is run up the side of the switchboard to the free transmitter binding post and through the cord to the transmitter. The operator's receiver jack consists of 4 springs; the 2 springs in the transmitter circuit, which have already been mentioned, and 2 others in the receiver circuit. One of the receiver springs is wired to one side of the secondary winding of the induction coil, and the other spring connected to one side of the listening keys. The free side of the secondary is connected to the free side of the listening keys.

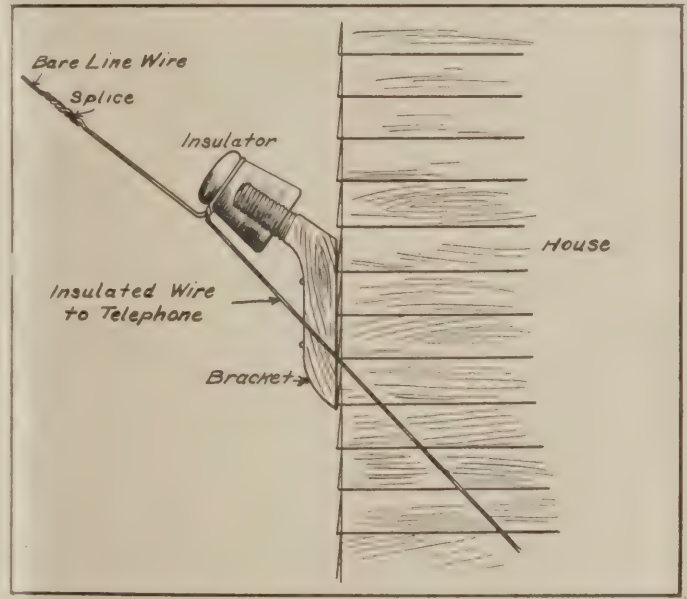
When the receiver plug is inserted in the jack, the receiver is connected in series to the secondary winding of the induction coil and to the listening keys. At the same time, the jack springs, in the transmitter circuit, are brought together and the battery circuit closed through the transmitter and primary winding of the coil.

The switchboard is equipped with a night bell connected in circuit with the line and clearing-out drops, so that, should a drop fall when the operator is not at the switchboard, the circuit will be closed through the night bell, which will continue to ring until the drop has been restored. As the operator is expected to be at the switchboard during the day, while the board is busy, a switch is placed in the night bell circuit, so that the bell may be cut out and made inoperative when desired. The locations of the bell and switchboard are shown in the drawing. A hand generator, for signalling purposes, is provided, and in addition a switch for cutting out the hand generator and cutting in ringing current from some other source.

A SIMPLE DEVICE TO STOP HUMMING.

By Charles Claydon.

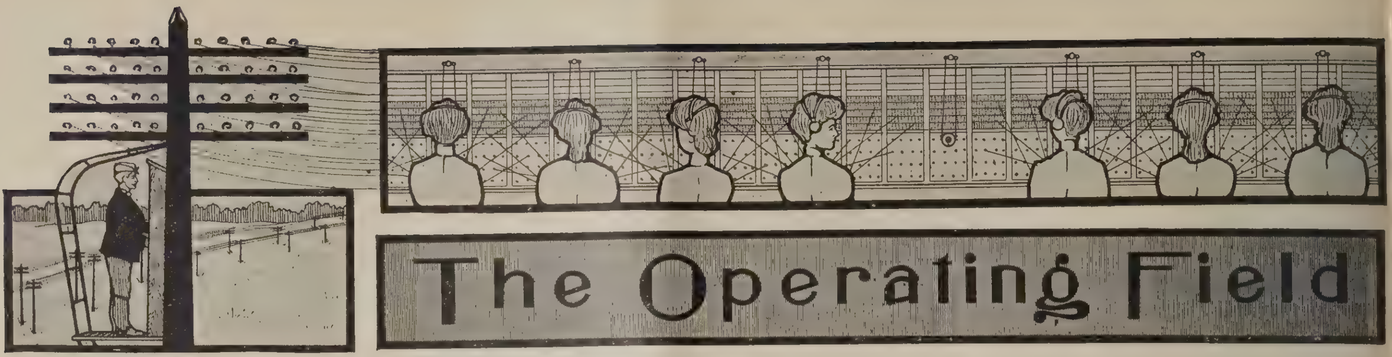
We have used the device, indicated in the drawing, in several instances to stop the disagreeable humming sound in a house to which a bracket, having on it a vibrating telephone wire, was attached. To secure this result a piece of heavily insulated No. 14 copper wire is spliced to the bare line wire, as shown in the drawing, and the covered wire made up around the insulator. The loose end of the copper wire is then run to the telephone, care being taken to leave it quite slack. This scheme has proven entirely successful wherever used.



POLICE TELEPHONE SYSTEM FOR NEW YORK.

Police Commissioner Greene has signed a contract with the New York Telephone Company for the installation on the streets of the Borough of Manhattan of 661 telephones for the use of the police. Nearly every police board has considered the installation of such a system, but has abandoned it because of its cost, which has been estimated at $400,000 or more, and the maintenance at $12,000 or $15,000 per annum.

Gen. Greene made a contract for the installation and maintenance of the system by the telephone company, at its own expense, he city to pay an average rental of $31.55 per telephone. $20,855.20 for the 661. These telephones will be inclosed in strong steel boxes and erected wherever possible on house walls. A complete description of the installation will be given in next week's issue of The American Telephone Journal.



The Operating Field

BELL OPPOSES P. & A. IN McKEESPORT, PA.

By H. A. Lane, *Special Correspondent.*

IN its efforts to establish an exchange and greatly improve its system in McKeesport, Pa., the Pittsburgh & Allegheny Telephone Co. has been lately continually impeded by the action of certain members of the city council, similar to the tactics of councilmen in other cities where the time worn Bell methods have been practiced. Under the direction of President J. G. Splane, a force of men started recently to lay conduits. Thereupon certain councilmen found suddenly that the company had forfeited its franchise as it had not laid the conduits within the period prescribed. The stipulated time was one year, and officials of the company proved that they had fulfilled the provisions of the franchise as far as they could under the city legislation. Another clause of the franchise was then produced which provided that the company should furnish free to the city of McKeesport 15 telephones to be located as council might direct, and which were to be in operation within one year after the franchise was granted. This was urged as a reason why the company should not be allowed to proceed as it had not installed the telephones. A letter was produced and the receipt of it acknowledged by the council, which was written last October, asking the council to name places where the telephones were wanted. As the city did not furnish this data the instruments were never installed.

Another complaint was that the permit to open the streets was not secured legally. It was claimed that under the franchise the plans of the company must be approved by the street committee. But the city engineer approved the company's plans and the street committee is bound to do the same, it is urged by the company, as they comply in every respect with the city ordinances.

The contracts which the Pittsburgh & Allegheny Telephone Co. are about to award, or have awarded, will amount to $400,000 for work in McKeesport. The contracts for the underground system have already been let and amount to about $150,000. A site has been bought recently for an exchange which will be started at once. By December 1, the company expects to have its system in full operation unless delayed further by the city council and within a year President Splane is confident 2,000 telephones will be in operation in McKeesport. The exchange building will be two stories high. There will be apartments for the operators containing lockers, baths, a sick room and kitchen. The underground work will be completed in 40 days and the exchange building in 90 days.

The opposition of the council members to the efforts of the P. & A. to improve its service in McKeesport has aroused a great deal of feeling among the citizens, who freely say it is a scheme of the Bell and the Federal Telephone Companies to keep the P. & A. out. So great has been the feeling the last few days that the papers have stood solidly with the P. & A. and the Mayor of the city it is said, would not harbor the complaints of certain councilmen that the P. & A. was not acting according to law.

BOWLING GREEN CO. OPENS NEW EXCHANGE.

THROUGH the medium of finely engraved invitations, the Bowling Green Home Telephone Company, of Bowling Green, Kentucky, asked all of its friends to be present at the opening of its new central energy exchange, which was held August 18. The building of the plant was started January last and has been pushed along with all possible vigor. The installation of 450 telephones has been completed and there are yet 50 or 60 contracts to fill. The farm lines, of which the company is making a specialty, are served with a selective lockout system.

A toll line is being built by the company to Montgomery, a distance of 27 miles and the Louisville Long Distance company recently completed a line, which gives it connection with the Bowling Green Company, which in the course of a few days, will enable conversation to be had to Northern, Eastern, Central and Western Kentucky, as well as to points in Indiana, Ohio, Illinois, Michigan and the affiliated territory. The Clarksville Home Telephone Company will build a toll line connecting with the Bowling Green Company's, which will give connection to a portion of the Southern field.

The officers of the company are: Nerge Clark, president; E. B. Stout, vice-president; F. Whit Potter, treasurer; W. B. Mayes, secretary. The directorate is composed of Nerge Clark, N. B. Mayes, J. Whit Potter, E. B. Stout and A. C. Wilkerson.

RATES RAISED, HOME COMPANY FORMED.

SOMEWHAT of an agitation has been created in telephone circles in Chattanooga, Tenn., by the sudden announcement of the East Tennessee Telephone Co., a branch of the Cumberland, which has a monopoly in that city, that it would, in the future, install only long-distance instruments, and charge $1.00 a month more for its service. Chattanooga people objected, so a number of capitalists met and organized the Hamilton County Telephone & Telegraph Company, took out a charter and have applied for a franchise which will at once be granted by the City Council. The news of this move brought the monopoly officers post haste to Chattanooga, where they have been in secret consultation for two days. While it is understood they will rescind the obnoxious order, it is not likely that this will have any deterrent effect on the organization of the new company, for telephone subscribers in Chattanooga have borne more than their share at the hands of the Cumberland company, and promise to give the new concern all the support necessary. Public sentiment is so strong that the City Council will not dare refuse the franchise, and the building of the lines and installation of a modern exchange will, without a doubt, begin in the near future.

NORTHEASTERN AGAIN VICTORIOUS.

RECENTLY the selectmen of Gorham, Maine, voted unanimously to grant pole rights in that town to the Northeastern Telephone Company, Lewis A. Goudy, general manager. The petition of the New England Telephone Company for a similar privilege was not settled, the selectmen reserving their decision until a future date. This is another victory for the Northeastern Company and incidentally Mr. Goudy, who has been waging such an aggressive battle for the Independent cause in the New England States.

ANNUAL MEETING OF WOODSFIELD COMPANY.

THE annual meeting of the stockholders of The Woodsfield Telephone Company, of Woodsfield, Ohio, which was one of the first Independent systems to be constructed in Ohio and which has very thoroughly developed the district in which it operates, was held in Zanesville, Ohio, August 13. Arrangements were made at the meeting for a connection with the United States Long Distance lines, and the president was authorized to purchase a large amount of material for the purpose of improving and extending toll lines throughout Monroe and adjoining counties.

A directorate was elected, as follows: F. C. Huth, W. E. Mallory, P. E. Fraley, L. E. Stegner and J. B. Rhodes. The directors elected officers, as follows:—President, J. B. Rhodes; vice-president, W. E. Mallory; secretary and treasurer, P. E. Fraley; general manager, F. C. Huth. L. E. Stegner was appointed foreman of construction.

NEW YORK INDEPENDENTS MEET AT CHESTER.

THE quarterly meeting of the Independent Telephone Association of Orange and Sussex counties, was held at Chester, New York, Thursday afternoon,, at which Messrs Morris B. Wolf, W. C. Ramsdell, and W. E. McWilliams were present as representatives from the Orange County Telephone Company, of Middletown. The toll rates have been partly established, and as soon as completed will be published.

Lines of the Independent companies have been completed through sections of Orange county, N. Y., and through Sussex county, N. J., as far as Newton. They also extend to Kingston and Poughkeepsie. It was decided to print a book of subscribers of each of the companies. Subscribers of the Orange County Company may have connections with Sussex and Port Jervis free of charge.

The Orange County Company now has its line open to Goshen. At present the Orange County Company is constructing a line to Crystal Run as an extension to the present line to Phillipsburgh.

The new automatic switchboard which was to have been installed in Middletown the first of the present month, has been delayed on account of the strike in Chicago of the freight handlers and truckmen. Dr. J. N. Miller, of Newton, N. J., who owns the controlling interest in the stock of the Sussex Telephone Company, reported that he was making arrangements for a connecting line between his company and Pennsylvania companies which will give Middletown subscribers through the Sussex company direct connections to Philadelphia and neighboring points. The next quarterly meeting will be held in Newburgh on Thursday, November 5th.

ASKS FOR FRANCHISE IN NASHVILLE.

By W. L. Arnold, *Special Correspondent.*

HARVEY MEYERS and many others of Memphis, Tenn., who are the owners of the Independent Telephone Company in that city, have applied to the Nashville City Council for a franchise in that place. They propose to furnish telephones to business offices for $48 per year and to residences for $30 a year and to furnish the city government with thirty telephones free of charge. They also agree to put all their wires in a subway when the same shall have been constructed by a company which has recently been granted a franchise for that purpose. The city is now paying the Cumberland Telephone Company, which has a monopoly, more than the taxes of that company amount to. The Meyers people also pledge themselves to cut the charges for the long-distance service to exactly half of what the Cumberland is now exacting.

Some months ago a local concern, styled the Tennessee Telephone Company, applied for a franchise, but was refused it by the City Council. Now this company again appears as a competitor to the Meyers people, and it is generally believed it is working in the interests of the Cumberland monopoly. Recently one of the attorneys for the Tennessee accidentally let slip the proposition, that the franchise be sold to the highest bidder, but the scheme was quickly understood by one of the council committee before which the hearing was held, and he showed clearly that the Cumberland could outbid any others and secure the franchise simply to hold it and keep out competition, and that they could afford to put up and lose a forfeit of $20,000 or $30,000 to have the field to themselves. The Council committee took no definite action at this meeting, postponing the matter for a week. The Cumberland Company is still using influence to kill the bill, but the Meyers people are influential themselves, and the general dissatisfaction with the present situation as to service and rates, is likely to be of material help to those seeking the new franchise.

STOCKYARD SYSTEM AT PITTSBURGH.

THERE will be installed at the New Union Stockyards on Herrs Island, near Pittsburgh, Pa., by the Pittsburgh & Allegheny Telephone Company, a telephone system which will undoubtedly facilitate trading and reduce to a minimum the time required for transacting business. In return for the support accorded their offer of a private exchange for the stockyards the live stock commission firms, the Pittsburgh Provision & Packing Company, and other interests located there, the company has arranged for a number of wires from the island exchange to its exchange in the city.

This will give patrons on the island quick and direct communication, not only with their customers in Pittsburgh, Allegheny and nearby towns, but also long-distance communication with shippers along the lines of the P. & A. and its affiliated companies. In addition, the island will be a little telephone world in itself, as each commission firm will have telephones placed in the cattle, hog and sheep pens exclusively for the use of its salesmen, so that the latter may call up their own and other offices or get in direct touch with their customers in Pittsburgh and elsewhere.

As a result of the good telephone service on the island, newspapers will be able to report more quickly and accurately any change in the late markets, especially on days when supplies are heavy and prices erratic. As a result, shippers will know of any sudden change at the closing hour in price or conditions and will be better able to judge whether to hold stock over for a day or so or to rush it off at once.

SOME INDIANA TELEPHONE TAX FIGURES.

By R. D. Fisher, *Special Correspondent.*

THE Indiana State Tax Board has completed its appraisement of telephone companies over which the board has original jurisdiction in fixing assessments for taxation. The appraisements are exclusive of real estate, structures, machinery, and appliances subject to local taxation. The Board will meet again in the near future, for the purpose of hearing any appeals that may be submitted for any change or modification of the assessment. The telephone companies were compelled to bear the increase of $1,775,973. The total appraisement of the one hundred and eighty-one telephone companies doing business in the State was fixed at $6,819,552. The increase is chiefly due to the building of additional lines, the rate of assessment per mile and value of individual lines having been decreased in many cases. The total mileage of wire is 127,287.54. The lowest assessment against any individual company is $5 per mile, and the highest $600 per mile. The Princeton Telephone Company and the Citizens' Telephone Company, of Kokomo, each pay an assessment of $600 per mile.

The New Telephone Company will pay taxes on $196,250, an increase over last year of $9,750. The increase comes wholly from the increased mileage, as the rate was reduced from $150 to $140 a mile. The appraisement of the New Long-Distance Telephone remains the same at $25 per mile. With the increased mileage, this will bring its appraisement up to $383,320.

NEW YORK MANAGERS MEET AT ROCHESTER.

CHARLES H. POOLE, secretary and general manager of the Utica Home Telephone Company, was in Rochester, New York, recently, to attend a meeting of the managers of all the Independent telephone companies in New York State. The purpose of the meeting was to adopt a uniform rate for long distance service in the State as well as to arrange for connections with the Independent companies of Indiana, Ohio and Illinois. The only handicap in the service of the Independent companies of this State at the present time is the operation of the long distance lines, but this will be overcome when the rate is adopted.

The Editor's Page.

SOME GOOD POINTS OF THE DIVIDED MULTIPLE.

ALTHOUGH the agitation precipated by Mr. Aitken's paper on the "Divided Multiple Switchboard" appears to have been quite forgotten, by the technical journals in general, there still remain a few undiscussed points which seem worth while to dwell upon. Obviously this much discussed type (the divided multiple) can be economically employed only in large systems where the proportion of trunked traffic is very high. In systems of moderate size, where but a few exchanges are required and the proportion of trunked traffic is small, the straight multiple board is, without a doubt, still the most efficient and most economical equipment.

To many adherents of the multiple board the proposal to revert to the divided type, and transfer all calls, will sound revolutionary. But, as pointed out in a recent issue of this paper, it is mainly a question of engineering economy. At a certain point in the change in the character of telephone traffic which goes on in all large cities, it will become economical to use divided boards, and when that point is reached divided boards will be used. The question of efficiency of service naturally comes up. Certain connections will be made more slowly than they are now. But how many connections and how much more slowly? When but one out of every ten calls is local to the board at which it is made, can one pretend that the subscriber will suffer any appreciable inconvenience if the handling of that one call is made uniform with that of the other nine? With efficient operating and plant the actual operating of a trunk call takes on the average not more than ten seconds longer than the actual operating of a local call. Will the subscriber notice this difference in the case of one call out of every ten? If the called subscriber were invariably at his telephone, ready to answer instantly, perhaps he would. But as the called subscriber will never work the service that way, it may be taken for granted that the difference in working will go unperceived by the subscriber.

On the other hand, there are several reasons why the general efficiency of the service would be improved by the use of the divided multiple, so that while the subscriber might lose a little time on the one connection, he would gain more than enough on the other nine to make up for the loss on the one. For one thing, the answering operators would not have a huge expanse of multiple jacks to search and grope over. The jacks in front of them would be answering jacks and trunk jacks only, and would be concentrated in a comparatively small space. Consequently, not having to range over a large field of jacks, the answering operator's work would be simplified and she would give a quicker answer to the average call. The uniformity of working would make for a general improvement. All calls would be handled in exactly the same manner, and the majority of operators would be trained to serve either exclusively as A operators or exclusively as B operators, and so, each operator being a specialist, the highest pitch of efficiency would be attained. In designing a new plant, special means could be devised for clipping of seconds and fractions of seconds, and also for a better distribution of the traffic.

APPARENTLY NO FIELD FOR THE INVENTION.

IT has always seemed to us that the telegraphone is a singularly unfortunate invention. While it is undoubtedly an invention of the very highest merit—perhaps it is not too much to say that it is the most beautiful and most original invention that has been made in telephony since the invention of the telephone itself—yet it seems to have no practical commercial application in connection with telephony. It is a recording telephone, and as a recording telephone it is a highly efficient and extremely simple instrument. Well and good. But do we want a recording telephone, and can we effectively use a recording telephone now that the telegraphone has provided it? Apparently not. In the first place, there is no real demand for it. A telephone message, like a cocktail, to do any good must be taken on the spot. Another beautiful invention, the telautograph, was to serve the purpose of a recording telephone. But it never has, and doubtless never will. The telautograph, a perfect scientific success, is a commercial failure. On rare occasions, it would be useful to have the means of recording a telephone message at the subscriber's station in the absence of the subscriber; calls for the doctor, for instance, or social messages. In business establishments there is always some one to answer the telephone and the recording facility would hardly be of value. But even if it be granted that a recording telephone in some cases would have a certain value, its practical adoption would require that the operator should be provided with means for switching in, starting and stopping the instrument and switching it out again whenever required. It will be seen that this is no simple problem. Until it is solved the telegraphone can hardly aspire to higher functions than those of the phonograph. As a phonograph it has the advantage of being without the rasping burr of that instrument.

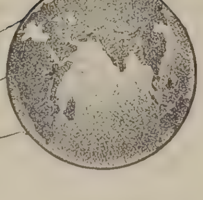
There have been two forms of the instrument developed, of which the smaller is apparently ready for the market, but it would appear to be applicable only to the same purposes as the now familiar phonograph. The larger type, on the other hand, which should have a wide field before it as a recording telephone for attachment to ordinary telephone exchange lines, has not yet assumed a final form suitable for the purpose.

TELEPHONISTS START EARLY IN IOWA.

A FEW years ago people in general did not know very much about the telephone instrument and regarded it as something mysterious and extremely complicated. The fact that the world at large is becoming more enlightened telephonically, is verified by the following anecdote which comes from Iowa: Fred Bishop, of Central City, who is well known among the telephone men of the State as an enthusiast on his branch of electricity, has a little daughter, Alice by name, who has absorbed considerable of her father's interest in the subject. Little Alice knows more than the average person about the telephone instrument, and is familiar with the names of most of the parts. The other day she stood looking out of the window watching the people pass, when the janitor of the church went by. "Oh, mama!" cried Alice; "there goes the generator." "Why do you call him the generator, dear?" answered the mother. "Why, because he rings the bell," was her immediate reply.

Foreign Currents

By "The Arrester."



WE learn from a note in the London *Electrician* that the telegraphone has made a reappearance in England. But little has been heard of this most beautiful invention since it was first publicly exhibited at the Paris Exposition of 1900. During the next year or so various articles describing the working of the telegraphone were published in the technical journals, but no practical application of the invention has yet been made, nor any adaptation of it to telephone practice, at least, so far as we are aware. During the last two years some progress has been made in improving the mechanical details, and the instruments now on view in London, says the *Electrician*, show that some advance has been made. In the smaller pattern of the instrument, a steel disc has been subsituted for the spiral wire formerly employed, while in the pattern for taking longer records the original steel band has been replaced by a fine wire.

What They Are Doing in Chili

SEVERAL times it has been noted in these columns how largely the telephone business of South America and Oriental cities is in the hands of small English companies, with headquarters in London. Another of these companies, the Chili Telephone Company, Limited, has just had a general meeting in London, and we extract the following points of interest from the report, which was published in full in a previous issue. The chairman said that for several years the business of the company has been making steady progress and profits had been increasing, and he thought it would be agreed that the report showed a good record for the past year. The gross revenue had increased by about 11 per cent.—not a startling increase to boast of, certainly—while the working expenses were about 48 per cent. of the revenue. The income received from Chili was $143,500, while the net profit, after deducting London expenses, etc., was over $116,000, as compared with $95,000 the previous year. From the net profits, $55,000 was put to reserve fund and a dividend paid of 6 per cent. on the capital of about one million dollars. This result was considered satisfactory, for the payment of a 6 per cent. dividend realized the expectations of the business when the company was started. Since they began operations, Chili had passed through difficult times, but matters were now more settled. There was no doubt that the people of Chili appreciated the advantages of the telephone, and the company's lines were being gradually extended through the country. During the past year 451 miles of wire were put up. It was intended to put the wires underground in Santiago, but the work had been postponed, awaiting the enactment of an underground wire law by the Chilian Congress. In conclusion, the chairman said that the whole of the company's plant was in an efficient condition, the service was being well maintained, and they could look forward to the continued prosperity of the company. Truly a satisfactory telephone report.

The National Company's Report

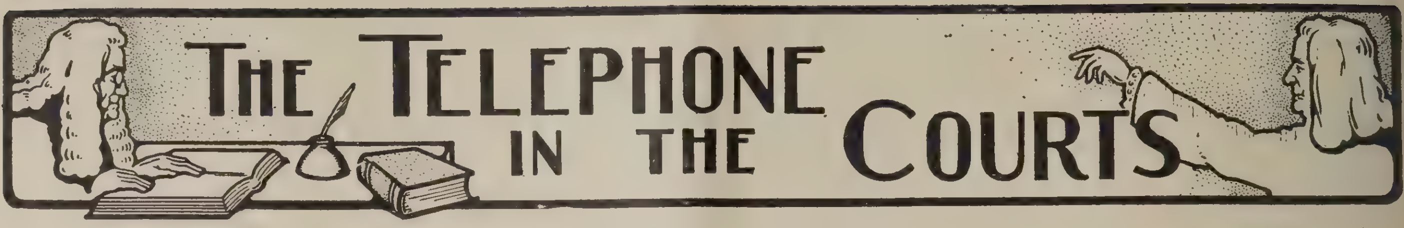
A REPORT of telephone affairs on a larger scale was that of the National Telephone Company for the half-year ended June 30, 1903. The gross income was $4,470,000, an increase of $354,000 over the corresponding period of 1902. The working expenses were $2,580,000, or $190,000 more. This increase came under several heads, increased business, increased taxes, higher wages, and higher insurance. The staff had increased by 600 in the half-year, and now reached a total of 12,064. The gross profit was nearly $1,890,000, but out of this had to be paid a heavy tax in the shape of royalties to the Government, amounting to nearly $410,000. Dividends were declared at the rate of 5 and 6 per cent. on the various classes of stock, this being an increase of ½ per cent. on the deferred stock, which previously got only 4½ per cent. Perhaps this is the National Company's method of replying to the challenge of municipal competition; if so, it must meet with the cheerful approval of the stockholders. The chairman, however, said he thought it more important to add to the reserve fund than to add to the dividend. They were adding $425,000 to the reserve fund, and had added the last half-year $350,000, but they ought clearly to see their way to putting to reserve $1,000,000 a year. The company's time was running out—they were rapidly approaching 1911, when their license would expire—and the reserve fund would be the latent strength of the company.

London Big Enough for Two

SPEAKING generally, the chairman said that they had spent in the half-year $1,670,000 on new plant and many thousands more than in the corresponding period of last year in keeping the existing plant in an efficient condition. The engineers and officials of the company were satisfied at the way in which the maintenance and renewal of the lines and instruments had been dealt with. In a company like theirs everything depended on the plant being kept up at its full value; and as in telephone apparatus and plant there was, perhaps, a more rapid deterioration than was the case in many other plants, rules which applied to permanent buildings could not be applied in the case of the company's plant. The directors, therefore, intended to pursue the policy of spending large sums from revenue to keep up the plant in its present state of efficiency. Their agreement with regard to London was working most satisfactorily. They were increasing their business in London very considerably, and so also were the Post Office, and the present arrangement justified what had frequently been said at their meetings—namely, that there was room in London for the two systems. The large development in both systems showed that a public want was being supplied when the additional capital was found by themselves on the one hand, and by the Post Office on the other. The total number of communications exchanged over the telephone exceeded ten times the number of telegrams handled by the Post Office.

The Management Congratulated

A SHAREHOLDER congratulated the directors on the excellent report they had presented. He thought the increase in the dividend very satisfactory, and agreed that the strength of the company would always be in the reserve fund, which he hoped would be added to very largely. From his observation he noted that greater smartness was now shown in the operation of the telephone service, and he thought this increased efficiency spoke very highly for the management of the company. Reference had been made to the increased business done by both the company and the Post Office in London, but with all the work that was going on in the two systems, there must be a considerable amount of waste, and their system being a company system, they had a great deal of difficulty to encounter with the local authorities. If the Government took over the company's property, all this would disappear and the public would gain very much. Perhaps.



THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

CITY COUNCIL CANNOT DELEGATE AUTHORITY TO CITY CLERK.

THE case of the Old Colony Trust Company, of Boston, Mass., as trustee for the Missouri & Kansas Telephone Company, vs. the City of Wichita, Kan., has been decided by the United States Circuit Court in favor of the plaintiff, and a permanent injunction has been granted, restraining the city from interfering in any way with the Telephone Company in maintaining, improving and operating its telephone plant.

The facts in the case were that the Telephone Company had a plant in the city and was operating under a franchise granted by ordinance of the city council. The company mortgaged its property to the Old Colony Trust Company, of Boston, to secure the payment of a large amount of bonds. The city contended that the franchise had expired and that the company had no right to do business in the city without permission by ordinance. In January, 1902, a resolution was passed by the council, directing the chief of police and fire marshal to remove all the company's poles, wires and fixtures from the streets and alleys of the city before September 1, 1902.

The Telephone Company contended that the franchise under which it operated had not been terminated, and that under authority granted by it the company had a right to set poles and string wires. It also asserted a right to do so under the State law, and contended that the council had no right to interfere aside from regulating its business and designating where its poles should be set and wires strung. The relief sought in the suit was to secure an injunction, restraining the city from cutting poles, removing wires, or in any way interfering with the use and operation of the telephone exchange in the city; and to enjoin the city from arresting or prosecuting the company's agents and employees for setting poles and stringing wires.

Judge Rodgers, presiding, held in his decision that the company's rights under the ordinance had not been terminated, and that the company, under the State law, had a right to do business in the city, even though the franchise had been terminated. He ruled that the action of the city council of September 24, 1900, in which the council intended to terminate the company's franchise, was not in fact sufficient to bring that about. The resolution adopted by the council directed the clerk to notify the company when its franchise would expire, and to instruct the company that it would be required to remove its poles and wires from the streets at that time. In accordance with the resolution, the clerk notified the company that its franchise would expire April 10, 1901. The court held that this action of the council amounted to a delegation of its authority to the clerk and that it had no right to so delegate its authority. The record of the council proceeding does not designate the time when the franchise would expire, simply showing that the clerk was instructed to notify the company when that time would be. The court stated that it was not necessary to give an opinion on the constitutionality of the law or as to the rights telephone companies have in Kansas, independent of city ordinance. The case being decided upon a mere technicality, further litigation will undoubtedly be had before the controversy is decided.

INJUNCTION TO COMPEL EXCLUSIVE CONNECTION.

THE Johnson County Telephone Company, of Davenport, Ia., has asked the District Court for a mandatory injunction to compel the New Union Electric Telephone & Telegraph Company to connect with two iron wires of the plaintiff and also to restrain it from connecting with any other wires belonging to other companies that might interfere with the Johnson County Company's business. The complainant states that it has two metallic copper wires and two iron wires strung from Davenport to Muscatine, and that the New Union Company has connected with the copper wires, but refuses to connect with the others. It also alleges that the New Union Company agreed not to connect with any other company that might be in competition with the Johnson County Company, but that it has made arrangements to do business with another company between Davenport and Tipton, and is making arrangements with other companies to use their lines. The complainant wishes this stopped and wants the New Union Company to do business over its lines exclusively.

TEMPORARY INJUNCTION DISSOLVED.

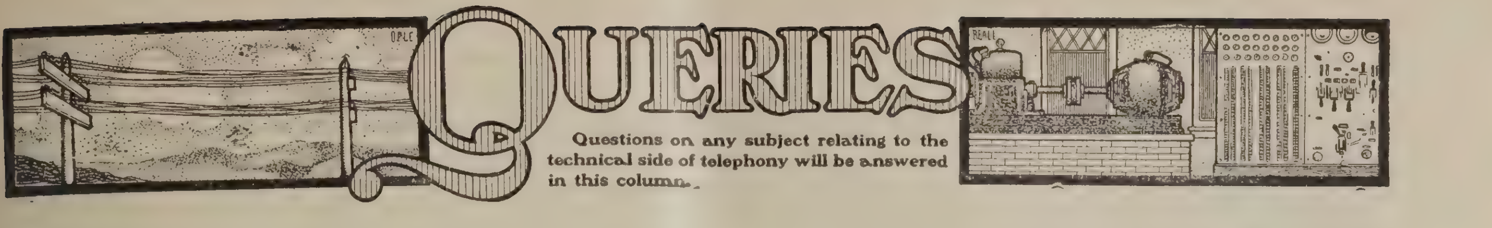
THE Union Trust Company, of Detroit, as receiver of the Michigan Telephone Company, has secured the dissolution of a temporary injunction granted by the Circuit Court at Sault Ste. Marie, Mich., to Thomas N. Rodgers, preventing the Telephone Company from removing his office telephone on his refusal to pay advanced rates, greater than those prescribed by city ordinance. The dissolving order was obtained upon a showing that the Michigan Telephone Company's affairs were before the United States Court, so that a State court would have no jurisdiction. Mr. Rodgers will apply to the Supreme Court for a mandamus to compel Judge Steere to try the case.

TELEPHONE POLE FELL THROUGH WINDOW.

MARY CONROY, of Oakland, Cal., is suing the Sunset Telephone Company for $10,000 damages. Her complaint alleges that a telephone pole fell and crashed through the window of the room in which she was sitting, and that she was frightened and permanently injured and left a physical wreck. She alleges that the falling of the pole was caused by its having been left in the ground until it had rotted off at the bottom. The company denies these allegations.

MECHANICS' LIEN AGAINST COLORADO TELEPHONE COMPANY.

SUIT has been brought against the Colorado Telephone Company in the district court of Denver, Col., by Louis Vierling to foreclose a mechanics' lien for $6,528.68, alleged to be due for work and material furnished in the erection of the company's new telephone building. The materials were furnished by the Paxton & Vierling Iron Works, of Omaha, and the Vierling, McDowell Company, of Chicago.



Questions on any subject relating to the technical side of telephony will be answered in this column.

MEANING OF TONE TESTS.—(173.)

What is a "tone test"? I have heard this term used in connection with large exchanges and would like to know what it means. A. H. S.

A "tone test" or "busy back" is obtained by interrupting an electric circuit a sufficient number of times per minute so that if the current pass through a telephone receiver it will produce a musical sound therein. Currents of this kind are used for various purposes, such as notifying a subscriber that the line he is calling for is busy or an operator that a line she has to call for is out of order or connected to a toll or long-distance line. These currents of different tones are made available to every operator by having jacks, which are connected to the generating machine, multiplied at each position. (See Fig. 173a.) If an operator wishes to put the tone test on a line in order to reserve it she will plug into the jack connected with the tone test generator with one of a pair of cords. The other of the pair she will insert into the multiple jack of the line that she wishes to put the tone test on. Any other operator plugging into this line will hear the musical tone which will inform her that the line is being held for a toll connection. The interruption is obtained by either a revolving break wheel, usually attached to the ringing generator, or a buzzer. Sometimes the interrupted circuit is further interrupted so as to give a break in the musical note, making the signal more distinct. In Figs. 173a and 173b are shown circuit arrangements for this purpose.

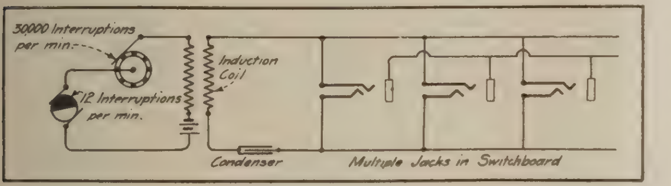

30000 Interruptions per min.
Induction Coil
12 Interruptions per min.
Condenser
Multiple Jacks in Switchboard

Fig. 173 a.

POSSIBLE VOLTAGE OF HAND GENERATOR.—(174.)

Please inform me as to what is the highest voltage that can be atained by a hand generator. Is it possible for one to generate as high a voltage as 500? G. L. G.

There is theoretically no limit to the voltage that a hand generator could be designed to give. Voltage is dependent upon the number of turns of wire on the armature, the strength of the magnetic field in which the armature revolves and the speed of rotation of the armature. To make a hand generator that would give the desired 500 volts it would probably be necessary to increase all three of the above factors, that is, more and stronger magnets would have to be used than ordinarily, there would have to be more turns of wire on the armature and it would have to revolve at a higher speed. In theory the result you wish could be attained by increasing by the desired amount any one of the three factors, but it is likely, in practice, all three would have to be increased. A generator which gave 500 volts would have to be very well insulated, very much more so than the ordinary hand generator. This would make the armature much more bulky.

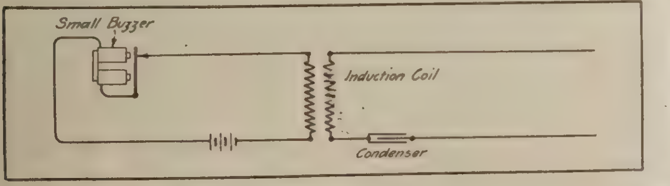


Fig. 173 b

CAUSE OF NOISY LINES.—(175.)

Two quiet lines on different leads become noisy, when connected. We use No. 14 iron line and larger return wire. Can you explain this? H. O. B.

The diagram in Fig. 175 may serve to make clear the reason of the trouble which you mention. Suppose, due to stray trolley currents, a difference of potential of 1 volt existed between the points at which the two telephones are located, as indicated in the drawing. Your lines may be well insulated, but if the insulation resistance falls to 1 megohm (1,000,000 ohms), a pressure of one volt will cause a current of 1/1,000,000 of an ampere to flow over them. This current (1/1,000,000 ampere) flowing through an ordinary telephone receiver would make a distinctly audible sound. If the return wire from the telephone to the exchange was the same resistance as the line wire, the current would flow over the two in parallel and very little would go through the receiver, but a difference of resistance in the two wires, made by bad joints or similar causes, would unbalance the line and current would flow through the receiver, making it noisy.

LIFE OF SWITCHBOARD SIGNAL LAMPS.—(176.)

Can you give me any information concerning the life of switchboard lamps? O. H. N.

Arthur Vaughn Abbott gave some time ago some figures concerning the life of incandescent lamps in switchboard work, and mentions one case where a lamp was flashed over a million times without showing signs of deterioration. His tests seem to indicate that for general service in swithcboard work the average lamp will live for a period of about 1,200 hours, although in laboratory tests a much longer life has proven possible. He points out, as a result of his observations, that according to theory, the lamps used in subscribers-line circuits should last about twenty-five years, and those in the cord circuits used as "supervisory" and clearing out lamps, from one to two years. He also says that such a life has already been obtained in the cord circuit lamps, but that it is doubtful if the theoretical limit for the line lamps will ever be closely approximated. The life of switchboard lamps is not so much a question of use as it is a question of mechanical injury. Experience shows that the average life of a line lamp is about 3 years. This means 10 to 12 cents a year per subscriber for line lamps. Cord lamps have to be replaced oftener than this due to the breaking of the filament which is caused by the impact of the plugs upon their seats. The life of a cord lamp is somewhere around 6 months.

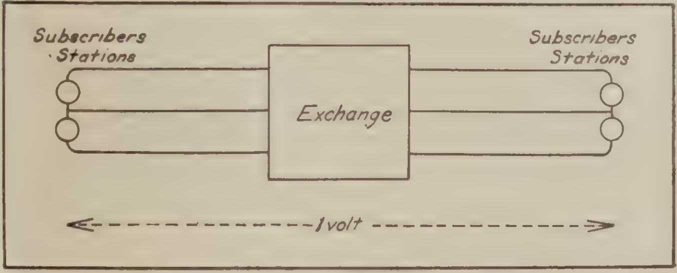


Fig. 175.

VOLTAGE OF TWO BAR GENERATOR.—(177.)

What is the voltage of an ordinary telephone ringing generator having two magnets? G. H. D.

An ordinary magneto generator having an average winding and two bar magnets will generate an electromotive force of about 75 volts, when turned at the ordinary rate.

PATENTS ISSUED

ANCHOR FOR GUY WIRES.

Edward E. Whitehead of New Paris, Indiana, patents (No. 735187) an anchor for guy wires. Fig. 1 shows the application of the device, Fig. 2 a top view of the anchor plate and Fig. 3 a section of the plate. The rod *J* is mounted in the thimble *E* and held therein by means of the head *K*. The guy wire is fastened in the ring *L*. In practical operation a small hole *M* is dug into the earth, much narrower than the length of the plate *D*, and the plate and rod dropped into the hole. A narrow hole *N* is then cut into the earth from the hole *M* toward the pole *A* and the rod J settled into the hole *N*. The guy wires *C* are then secured in eye *L*. As the wires *C* are tightened the plate *D* is turned, so that its ends *I* dig into the sides of the hole *M* thus making a secure anchorage for the rod *J*.

Fig. 1.

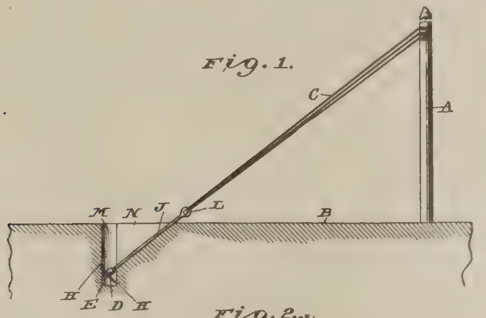


Fig. 2.

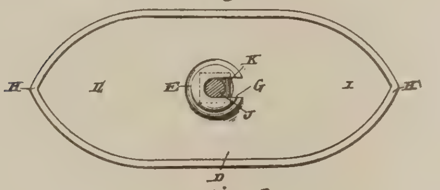
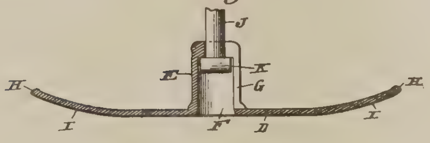


Fig. 3.



VOLT AMPERE METER.

Maurice C. Rypinski and Joseph Le Conte Davis of Schenectady, New York, patent (No. 729422) a volt ampere meter and assign their invention to the General Electric Company. The invention relates to a modification of a hot wire instrument in which the movement of a pointer moving over a scale is governed by the expansion of two wires, one wire being affected by the current flowing in the circuit and the other by the impressed voltage. Fig. 1 shows a plan view of the instrument, Fig. 2 a side elevation and Fig. 4 a section on line *4-4* of Fig. 1. The wire *9*, which is acted upon by the current flowing in the circuit, is fastened to posts *8-8* and to shaft *6*. The wire passes through a hole in the shaft and is given a reverse turn around it. The wire *12*, one end of which is fastened to the sliding carrier-block *13*, and the other end to the guide *3*, is affected by the impressed voltage. Thus the voltage acts on the circuit from binding post *20* to spiral *19*, through wire *12*, collar *15* and spiral *16* and wire *16*a to binding post *18*. A spiral spring *24* carried by spindle *22*, causes the spindle to revolve and take up any slack in the cord *21*, one end of which is attached to carrier *13*. The slack in the cord is due to the simultaneous expansion of wires *9* and *12* and in consequence the movement of the pointer registers the product of the volts and amperes in the circuit.

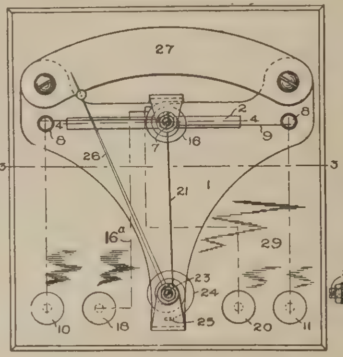


Fig. 1

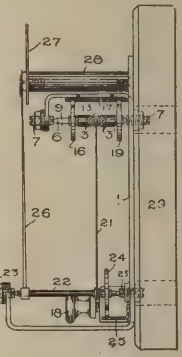


Fig. 2.

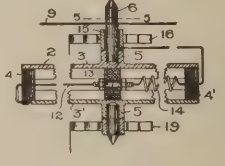


Fig. 4.

ELECTRIC BATTERY.

Edmund Tweedy of New York, Isaiah L. Roberts of Brooklyn, N. Y., and George R. Tweedy, of Danbury, Conn., patent (No. 729240.) An electric battery, and assign their invention to the Roberts Battery Co., of New York. The invention relates to two fluid batteries and has for its object the production of a battery of this type which will show improved efficiency, dura-

Fig. 2

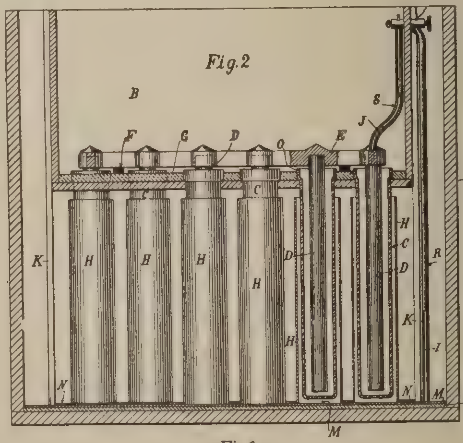
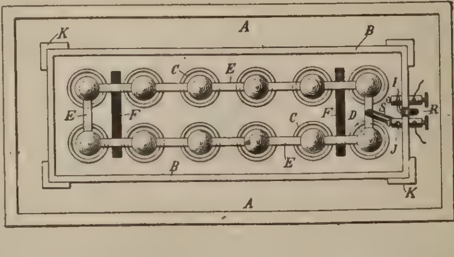


Fig. 3



bility and economy. Fig. 2 shows a vertical section of the battery and Fig. 3 a plan. The receptacle is filled up to the top of the cups with a layer of acid-proof cement. The carbon elements *D-D* are connected by a gird of metal *E* cast around the tops, the gird resting upon the insulating supports *F-F*. An amalgamated copper plate *M* is placed upon the bottom of the cell and the zinc elements, in the form of cylinders set on this plate. One terminal of the battery is taken from the plate *M* and the other from the gird *E*. The zinc cylinders are held in position by a sheet of non-conducting material placed upon the plate *M*. Holes for the cylinders are cut in the insulator.

FLEXIBLE TUBE FOR CONVEYING AND RECEIVING ARTICULATE SOUNDS.

Frank W. Wood of Newport News, Virginia, patents (No. 735645) a flexible tube for conveying and receiving articulate sounds and assigns his invention to Chas. Cory & Son, of New York, N. Y. Fig. 1 shows a front elevation of a telephone apparatus with the sound conveying tubes fitted thereto. The tube comprises an elbow *3*, which is capable of rotation in the socket formed by the plate *8* and flange *4*. Between the elbow *3* and an ear piece *13*, is a flexible tube of coiled wire, inside of this is a tube of rubber composition *19* and inside of this a metallic tube *18*. The construction of the tube is clearly shown in Figs. 1 and 2. The invention is also intended to be used in connection with a mouth piece as a speaking tube.

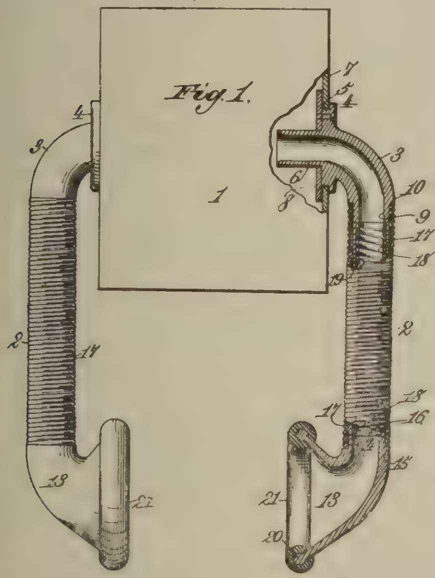
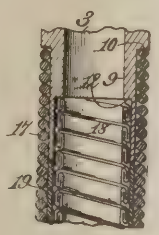


Fig. 1.

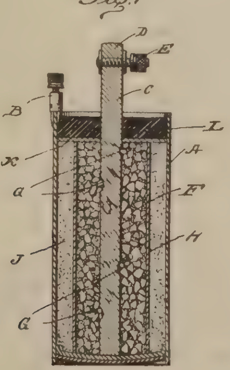
Fig. 2.



BATTERY.

Daniel Drawbaugh of Ebuly's Mill, Pa., patents (No. 733949.) a battery. The object of this invention is to provide a cheap and improved form of dry battery. Fig. 1 shows a vertical sectional view of the battery and gives its construction. The outer cylinder *A* is made of zinc, the inner rod *C* is of carbon. Around the carbon and inside of the porous cylinder *H* is packed a composition of coke, plumbago and sufficient plaster of paris to form a paste. Between the cylinders *A* and *H* is packed a composition of concentrated lye or caustic soda, with sufficient plaster of paris to hold the composition in form. *K* represents a heavy ring of paper upon which is poured a layer *L* of melted tar to hermetically seal the battery.

Fig. 1



ELECTRIC MEASURING INSTRUMENT.

John Franklin Stevens of Philadelphia, Pa., patents (No. 735168) an electric measuring instrument. The invention refers to a dead beat voltmeter or ammeter in which the field created by the permanent magnet is kept constant. The instrument is based upon the measurement of a current conveying coil in the field of a permanent magnet. Fig. 1 shows a plan view of the instrument without the core. Fig. 2 a section on line *2-2*, Fig. 4 a section on line *4-4* and Fig. 7 a diagramatic veiw of the coil. The generation of a current in the short circuited secondary coil *22* in Fig. 7, serves to check the vibrations of the needle when the current is started through coil *21* and thus renders the instrument dead beat. The improvement claimed for the instrument lies in the fact that the moving parts are connected to a removable bracket as shown in the drawings and can thus be inserted or withdrawn without removing the pole pieces from the magnet and breaking the magnetic circuit.

Fig. 1.

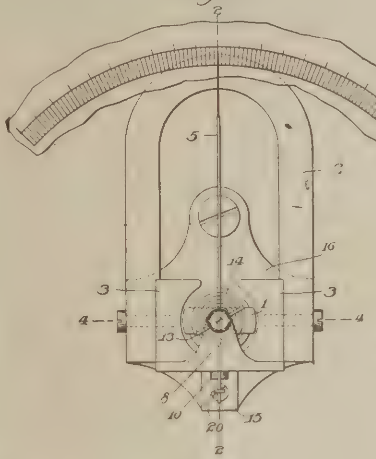


Fig. 2.

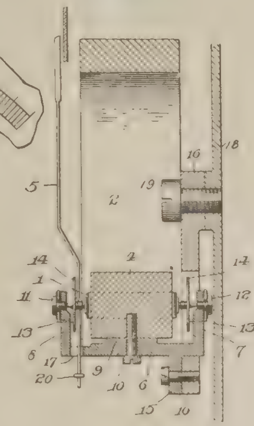


Fig. 4.

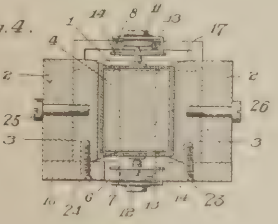
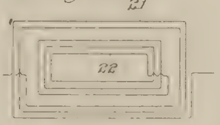


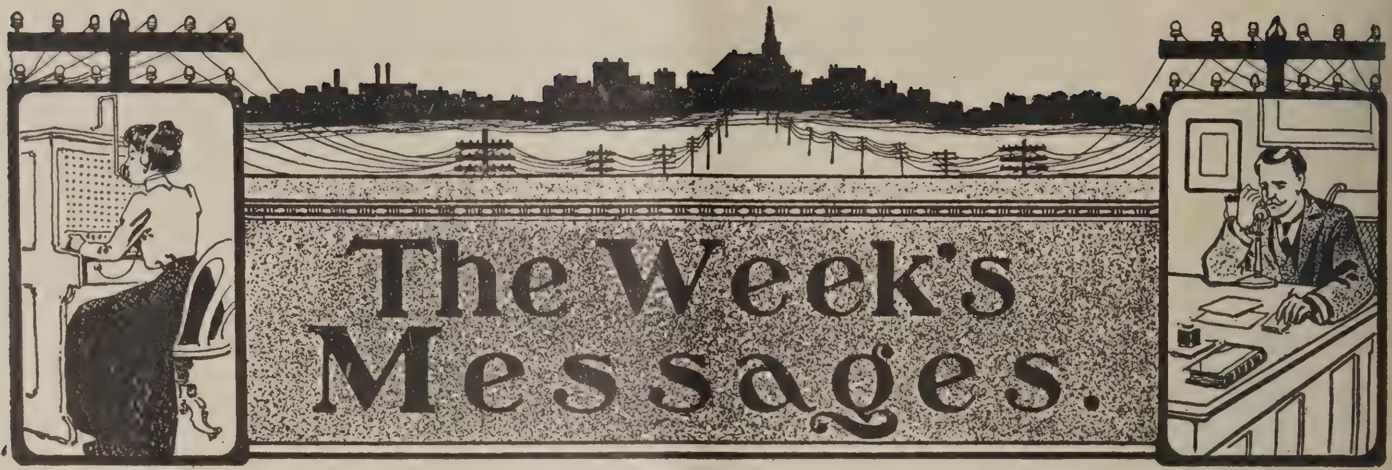
Fig. 7.



PUPIN'S TRANSOCEANIC SYSTEM CRITICIZED.

DR. JENTSCH, of the German telegraph service, recently criticized Prof. Michael Pupin's system of long-distance telephony. His objections were leveled, not at the electrical features of the system, but simply at certain mechanical difficulties that might be encountered. In his opinion, external pressure of the water would increase with the depth to which a submarine cable was laid, says *The Scientific American.* At a depth of 2 or 3 miles it would not be impossible that a pressure of 3,000 pounds to the square inch would be found. From this Dr. Jentsch concluded that the inductance coils of Pupin, unless constructed with extraordinary strength, would be crushed in. Dr. Jentsch, however, as well as Professor Pupin himself, agrees that the difficulty is by no means insurmountable.

It has also been said that transatlantic telephony will not pay. Professor Pupin is himself of that opinion, not because of any inherent fault in his system, but because of the customs of the business world. A translantic telephone system would be used chiefly during the business day of six or seven hours. Since the day begins in London and Paris five hours earlier than it does in New York, it follows that only during a period of one or two hours would the line be in use.



The Week's Messages.

FINANCIAL

WEST LIBERTY, IA.—The West Liberty Telephone Company has increased its capital stock from $10,000 to $25,000.

STURGEON, MO.—The New Century Telephone Company of Sturgeon filed articles showing that it has made an increase in its capital stock from $10,000 to $20,000.

JOHNSTOWN, N. Y.—The Glen Telephone Company has increased its capital stock from $100,000 to $300,000. The increase was taken to provide means for developing and increasing its business and extending telephone lines in every direction.

SEATTLE, WASH.—The Independent Telephone Company voted in favor of increasing the capital stock of the company from $600,000 to $1,000,000.

BURLINGTON, WIS.—The directors of the Burlington, Rochester & Kansasville Telephone Company will increase their capital stock from $2,500 to $5,000. The company will shortly extend its lines to Waterford and Honey Creek.

FRANCHISES

LOUISVILLE, KY.—The Town Board of Charlestown has granted the Home Telephone Company a franchise to erect poles on the streets of that town.

PORTLAND, ME.—At a meeting of the South Portland city government, a hearing was given on the petition of the Northeastern Telephone Company for a franchise. An order was introduced granting the privileges asked for, and given its first reading.

CARTHAGE, MO.—J. W. Layne has returned from Lamar, where he went to make application to the city council of that city for a franchise to construct and operate a new telephone system there.

PLAINFIELD, N. J.—For the purpose of acquainting themselves more fully with Independent telephone systems, the Common Council, at its regular August meeting, voted to have a committee from that body inspect the workings of these systems and report its investigations with a view to granting another franchise in this city. The resolution included President Buckle, W. S. Tyler, chairman of the license committee, and R. I. Tolles, chairman of the streets and sewers committee.

BATH, N. Y.—The village board of trustees has granted H. S. Emerson, representing the Emerson rural telephone line, permission to extend the line into the village.

COVINGTON, O.—An ordinance providing for the sale of a franchise to operate a telephone and telegraph company in this city, with the right to string wires over and beneath the streets and other thoroughfares, has been presented to the Council. The ordinance was got up at the request of the North Kentucky Telephone and Telegraph Company, an incorporation recently formed in this city with a capital stock of $100,000. The ordinance is similar to the one under which the company was granted a franchise some weeks ago, Council having accepted its bid as the highest and best, with the exception that several features of the old ordinance have been eliminated. This was done because of the fact that the Courts declared the old ordinance invalid, due to these features. The new company is controlled by F. K. Ludlow, Sol Kineon, and M. M. Durrett, and they claim that they will have the new lines in operation in Covington inside of thirty days.

GORHAM, ME.—The selectmen have unanimously voted to grant pole rights to the Northeastern Telephone Company of Portland.

EL PASO, TEX.—The city council by resolution has declared the franchise of the Bell Telephone Company forfeited and ordered the company to discontinue doing business here, and authorized the city clerk to advertise for bids for a telephone franchise. The new company is here trying to secure a franchise. The old company's refusal to put its wires underground and to give a better service is the cause of the city's action.

COMBINATIONS

SUMNER, IOWA.—The Sumner Telephone Company, capitalized at $30,000 and owning about 150 miles of lines and large exchanges at New Hampton and West Union, besides several smaller ones, will pass under the control of Victor Stevens, who controls the Standard and Interstate lines, the last of the month. Mr. Stevens bought of the two chief stockholders of the company $18,000 worth of the stock, paying 80 cents on the dollar.

AUSTIN, TEX.—It has been stated here that H. E. Huntington, who recently purchased all of the Independent telephone toll lines in Texas, aggregating one thousand miles and for which he paid four hundred thousand dollars, has practically closed negotiations for the purchase of the Independent telephone exchanges located in Austin, San Antonio, Houston, Corsicana, Waco, Beaumont and nearly a score of other towns of smaller size in this state, Louisiana and Indian Territory. The amount involved in the purchase of these several local exchanges exceeds $3,000,000.

EL PASO, TEX.—News received here from Parral, Chih., Mex., is to the effect that the electric light, telephone and water plants of that place were sold under foreclosure of mortgage on the 25th ult. The purchaser was the mortgagee, E. O. Lindbloom, and D. W. Grubbs has charge of the property.

PERSONAL

OCE CURTIS, for the last fourteen years an employee of the Iowa Telephone Company in Sioux City, Iowa, has gone to Minneapolis to accept the position of wire chief for the Twin City Telephone Company.

W. R. MORRIS, division superintendent for the Boynton Telephone Company, was in Farmingdale, Ill., recently inspecting the lines in that section.

C. W. BURKETT has been appointed engineer of the Wisconsin Telephone company at Milwaukee, vice C. L. Boyce, who resigned to enter the service of the Missouri and Kansas Telephone Company.

COL. C. C. NESMITH, who has for many years been manager of the Huntsville and Guntersville long distance telephone line, the first long distance line put up in North Alabama, has retired from active business. The wire will be operated by the Gurley Telephone Company, of Gurley, Texas, in the future.

UNDERGROUND

DUBUQUE, IA.—Extensive improvements necessitating the expenditure of a large sum of money will be made in Dubuque by the Iowa Telephone Company within the next year. The company's plans were announced at the regular meeting of the council Thursday night, when a resolution asking that an ordinance be adopted requiring all telephone companies to put their wires underground was read.

LINTON, IND.—The New Home Telephone Company will spend $25,000 in putting their wires underground.

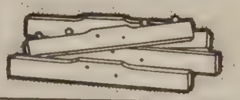
MILLVILLE, N. J.—The new underground system of the Interstate Telephone Company here has been completed.

SALT LAKE CITY, UTAH.—General Manager Murray, of the Rocky Mountain Bell, has asked the city engineer for a line along which to construct a conduit for the burial of all the telephone wires on South Temple street from State to Tenth East streets.

MISCELLANEOUS

INDIANAPOLIS, IND.—The Interstate Telephone Company, of Wisconsin, has complied with the foreign corporation law by filing a copy of its articles of incorporation with the Secretary of State. The company has $4,000 invested in telephone lines in Indiana.

New Construction in the Field



ATLANTA, GA.—The Standard Telephone Company has completed arrangements for the long distance service. Mr. T. J. Simmons, president of the company, says an agreement has been reached with a long distance company to have a service in operation from Savannah to Atlanta and from Birmingham here. This will connect the Standard with many local exchanges along these lines, and in addition to these a line has been started from Atlanta to Covington.

WEBSTER CITY, IA.—The Martin Telephone Company is increasing the capacity of its switchboard to 1,000 telephones.

LANARK, ILL.—The Lanark Mutual Telephone Company has put up over 400 feet of cable and installed thirty-six telephones with more expected daily. They have also ordered 300 poles to lay out new routes.

STERLING, ILL.—E. A. Emmons has organized a farmers' telephone company south of here. The proposed line will run from Tampico to Hahnaman station.

FT. WAYNE, IND.—The National Telephone and Telegraph Company is putting in a new copper wire, with through connections to Indianapolis. The long-distance business between Fort Wayne and Indianapolis has increased materially.

DODGE CITY, KAN.—The Dodge City Telephone Company has commenced the building of a branch telephone line to Fort Dodge Soldiers' Home, five miles east of here. There will be something like twelve telephones on this line. Captain Churchill, whose alfalfa farm is nearly a mile west of the city, is having a line built to his residence from town.

ERIE, KAS.—The Erie Telephone Company has just completed a long line south of the town. The company will build another line for the service of farmers.

CALAIS, ME.—The new telephone line of the Forest Telegraph & Telephone Company is rapidly nearing the city limits. The main office is at Calais, with Dr. L. Brehant as general manager. Later in the season the company expects to connect by cable with the neighboring Dominion islands in Passamaquoddy bay.

WINONA, MINN.—The Winona Telephone Company will extend a line to Mount Vernon and Houston.

CAMDEN, MICH.—The Camden Telephone Company has completed a line from the north to this village. They have a large number of local and rural subscribers.

DETROIT, MICH.—Capitalists are here from Rochester, Chicago and St. Paul to organize an Independent telephone company for the purpose of competing with Don M. Dickinson's syndicate which is to buy the Michigan Telephone Company. It is understood they have an option on the franchise of the People's Telephone Company, which deal will probably be closed at once. They called on Mayor Maybury and were told to submit a proposition to the city. Among those who have been here are: Arnold Kahlman, of St. Paul; E. H. Saterlee, president of the Rochester Telephone Company; Alfred Stormberg, of Chicago, and Thomas W. Finucane, of Rochester, of the Stromberg Carlson Telephone Manufacturing Company. It is their purpose to join hands, organize a company and operate with the other Independent companies of the state.

LAINGSBURG, MICH.—John E. Hisey, of this place, is installing a telephone exchange at Bath. A little over a year ago Mr. Hisey built an exchange here.

NEWAYGO, MICH.—The Citizens Telephone Company has received a carload of poles, which will be used in constructing new lines.

MARSHVILLE, N. C.—Mr. J. C. Austin, who has bought and taken charge of the Marshville Telephone Company, is arranging to order a new and larger switchboard.

PLAINFIELD, N. J.—The Somerset County Telephone Company, better known as the Home, cancelled its lease to the State Telephone Company. Spencer Weart has succeeded Mr. Atkinson as president, and the lines are being rebuilt and put in a first-class condition under the supervision of foreman Wm. Trumbull.

AFTON, N. Y.—Several men are employed on the Susquehanna Valley telephone line in and near the village. New poles are being set and a trunk line put through to Binghamton. The company will spend some $2,000 in improving its lines.

ANGELICA, N. Y.—The lines of the Angelica Telephone Company have been extended to Bennetts and as far north as Haire's, from that point it runs east to Jersey Hill.

FREEPORT, L. I., N. Y.—The South Shore Telephone Company has removed its central office from Charles Schneider's to the house recently purchased by it and installed a new 150 drop operating board. The company has rebuilt its lines throughout Nassau County and has established a first-class service. Extension of the lines is under way to Babylon from Merrick and, after that, a trunk line will be built to Brooklyn.

GENEVA, N. Y.—The Geneva Telephone Company is actively engaged in making local connections with towns not yet in communication with this city. Manager F. S. Bronson states that all that now is necessary to connect Geneva with Elmira, Binghamton, Southern New York and Northern Pennsylvania, as well as Dunkirk and Western New York, is to finish the line from Geneva to Falls Corners and from Geneva to Penn Yan.

LEONARDSVILLE, N. Y.—The business men have taken steps to increase telephone advantages by establishing a line to connect this village with Brookfield and other towns west of here. At a recent meeting the subject was favorably considered, and an organization was formed with Eli S. Brand, president; Irving A. Crandall, secretary, and A. M. Coon, treasurer. Connection with the Brookfield line is asured, and the contract for construction has been let to C. E. Holmes. Connection with Burlington Flats, West Winfield and other towns east of here is desired, and committees have been appointed to canvass that territory. The office of the new line will be located in the store of M. E. Ellsworth.

OLCOTT, N. Y.—The Orleans Rural Telephone Company is erecting a building in which it will have an exchange.

BUCKLAND, O.—C. F. Bowsher, of near Buckland, was in Shawnee recently, looking after telephone interests. It is the intention of the Buckland Telephone Company to extend its lines into the western part of the township.

CINCINNATI, O.—The incorporators of the new Interstate Telephone Company state that if they secure entrance to this city, as they expect to do, they will expend from $3,000,000 to $5,000,000 in building the plant. Men are now at work stringing wires in Kentucky and connection has been made from Louisville to a point about 35 miles from Covington. It is the intention to operate from this city to a number of neighboring towns.

NEWARK, O.—Manager Hollander, of the Newark Independent Telephone Company, has strung 3,000 feet of new cable in West Newark and has 12,000 more feet on hand ready to put up. Within two weeks he will be able to add a number of West Newark subscribers to the exchange, it being impossible to put more subscribers on the system in that part of the city until the new cables are up. The work of rebuilding the Granville exchange will be finished this month, and during the month of September five farmers' lines will be run out of Granville in as many different directions to accommodate rural patrons of the system. Work on the new exchange at Hebron, which, with the farmers' lines there, will have 200 subscribers, has just been commenced.

PITTSTON, PA.—The People's Telephone Company expects, in the near future, to run a new trunk line from this city to Centremoreland.

SPRING CITY, PA.—H. A. Heck, Spring City, has secured the contract to put in the telephones at the Montello Brick Company's plant at Perkiomen. Two thousand one hundred and fifty feet of cable will be required to equip the building.

YANKTON, S. D.—The Independent Telephone Company, of Yankton, is rapidly pushing forward and reports great progress. The company is officered by W. H. Edmunds and J. J. Wagner and has a capital of $200,000.

ST. ALBANS, VT.—The workmen of the Franklin County Telephone Company are just completing this end of a new copper trunk line through from Burlington to St. Albans.

WALLULA, WASH.—Lyman Griswold, of Helix, Ore., has just been here in the interests of his barbwire telephone system. He intends to extend the line of Wallula soon.

WHEELING, W. VA.—The Baltimore & Ohio will in the near future build two telepragh lines from this city to Pittsburg. A. Stevens, of Baltimore, superintendent of construction and repair work of the telepraph and telephone systems of the Baltimore & Ohio, was in the city recently repairing the telephones here and also doing some repair work on the telegraph lines.

WEST DANVILLE, VT.—M. .E. Beckley, business manager for the Molly's Falls Electric Light, Power and Telephone Company, was in West Danville and vicinity recently, establishing a people's telephone line as an auxiliary to those now under the management of his company.

SUNSET, WASH.—The rural telephone line has been extended from here to Thornton. The system now embraces St. John, Pine City, Sunset, Thornton, Oakesdale and Rosalia, taking in over 100 farmhouses in the territory covered.

SHIOCTON, WIS.—The Shiocton Telephone Company has completed its line to Leeman.

WASHBURN, WIS.—The Home Telephone Company, of Ashland, has entered this city with a toll line and expects to install a local exchange here this fall. The company is also running a line to Lake Nebagamon and to the cities at the head of the lakes. A telephone line has recently been put in operation between Bayfield and the new town of Cornucopia.

GATE CITY, VA.—R. Hurst & Son are building a telephone line from Pattonsville to this place.

WEST BEND, WIS.—The Jackson Telephone Company has decided to extend its line from Little Cedar Lake, so that in a short time telephone connection can be had with most of the summer resorts at both of the lakes.

THE WEEK'S MESSAGES—Concluded.

SHELBYVILLE, O.—The Queen City and Shelby Mutual Telephone Company, which was recently incorporated with a capital stock of $10,000, will start work on putting in its lines as soon as possible. The incorporators of the company are Jacob F. Ulmer, S. A. Richardson, James H. Thomas, George Griffith, William O. Bennett.

BEDFORD, PA.—The Bedford-Fulton Telephone Company has completed its new line from Everett to Ray's Hill and Breezewood. The company has started to put up wires on the line to Gapsville and Crystal Springs.

FLEETVILLE, PA.—The Fleetville Telephone Company is stringing wires from Dalton to Fleetville.

LOCK HAVEN, PA.—The Commercial Telephone Company will build a line from Rauchtown to Collonsville and Jersey Shore.

SHAVERTOWN, PA.—J. G. Leek, of Ketcham, and Mr. Gay of Orange, representing the Northmoreland Telephone Company, were here and at Trucksville for the purpose of extending that system to these places.

WARRINGTON, PA.—A meeting of the Mutual Telephone Company was held at the residence of W. H. Holbert, at Warrington, recently, to discuss various problems which have arisen because of a desire to expand the benefits of the system.

COVENTRY, R. I.—Workmen in the employ of the Coventry Telephone Company are installing the poles and wires in Coventry and West Greenwich.

LENNOX, S. D.—The Lennox Telephone Company has received three carloads of poles, which are to be put out in the country at once.

WORTHING, S. D.—The Worthing Electric Company, a new telephone organization, will soon be in operation at Worthing. The officers of the new company are: Mat Johnson, president; J. M. Montgomery, secretary; A. F. Hawn, treasurer; F. J. Hawn, general manager. Poles are being put in place and the lines will be in operation within a few days. To start with, there will be a 50-drop switchboard and business will begin with thirty-five subscribers. The company has a capitalization of $5,000.

TRADE NOTES

J. F. Butterfield, Electrical Engineer and Contractor, of 113 Adams Street, Chicago, has closed a contract with the Citizens' Telephone Company, of Kokomo, Ind., to reconstruct its plant inside of the fire limits, the reconstruction to begin at once. Nearly 35,000 duct feet of conduit will be laid and 30 manholes will be built. Connections will be made for 500 telephones. Practically all of the material is on the ground at the present time, and Mr. Butterfield has a crew now at work, and expects to have it completed by September 10. This is the last of nine contracts which Mr. Butterfield has been working on.

The Kellogg Switchboard and Supply Company, of Chicago, Ill., has recently been awarded a contract by the Pittsburg and Allegheny Telephone Company, for a three thousand line common battery, multiple switchboard, for McKeesport, Pa. Present equipment, one thousand lines. They have also received an order from the National Telephone Company, of London, England, for an eight hundred line common battery board for Lavender Hill, London. A contract has also been awarded them for the entire exchange equipment at Pasadena, Cal. This is a seventy-two hundred line switchboard, with fifteen hundred lines equipped. The contract includes the telephone instruments.

The Stromberg Carlson Telephone Company, of Rochester, N. Y., and Chicago, Ill., has issued another one of its bulletins. This one, number 5, describes the "Central Energy Telephones" and telephone parts made by the company. This, as the others of the series, is arranged to be bound in a cover so that when all of the bulletins have been issued they can be kept together in one binder. All supplementary sheets and pamphlets prepared by the company will be made this size. The book is illustrated with fine half-tones and is on coated paper. The different types of central energy instruments manufactured by the company are illustrated and described and the code numbers given for the different types. The last third of the book is devoted to descriptions and illustrations of the component parts which go to make up the central energy instrument. On account of the large number of inquiries received lately, the company is manufacturing a transmitter and a receiver which follow closely the Bell design in external appearance. Both of these are described in the bulletin. The series is being issued under the direction of F. L. Martain, advertising manager for the company.

PLANTS FOR SALE

Advertisements under this head $1.00 *for 25 words or less for each insertion. Prepaid.*

TELEPHONE EXCHANGES—Two first-class telephone exchanges for sale. One 180, the other 200 telephones. Also 20 miles of metallic and 30 miles of grounded toll line. All standard construction and in first-class condition. Net income over $4,000 per year. Price, $15,000 cash or good paper. No trades considered. Address UNITED TELEPHONE CO., Malden, Mo.

TELEPHONE PLANT. Best paying telephone plant in Kansas for sale. For full description and particulars address, Box 76, The American Telephone Journal, 116 Nassau St., New York City.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

THE LIBRARY OF CONGRESS desires to secure Volumes 1, 2, 3 and 4 of The American Telephone Journal for its file. Parties who may have these volumes, or parts of them, which they would like to dispose of, please communicate with the LIBRARIAN OF CONGRESS, Washington, D. C.

POSITION.—At liberty after Sept. 1, a competent telephone man. Want position as manager. State salary you can pay and what you want for your money. Address M. L. GAY, Union City, Ind.

EXCHANGE WANTED—Would like to purchase a telephone exchange in a good live town; one in the West preferred. Writer would accept a position as manager of an exchange. Address BOX 63, The American Telephone Journal.

POSITION. Wanted position as wire chief in central or western state. College graduate in electrical engineering and have had 3 years' experience as foreman on central energy installations. Address Box 77, The American Telephone Journal, 116 Nassau St., New York City.

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau street, New York City.

WIRE CHIEF.—Wanted at once wire chief to handle central energy system of 600 subscribers in Indiana. State salary expected and detail references. Only the competent need apply. Address Box 79, The American Telephone Journal, 116 Nassau Street, New York City.

POSITION.—Wanted position as machine shop foreman in a telephone factory by a first-class toolmaker, who for the past five years has been and who at present is filling a similar position. Address Box 78, The American Telephone Journal, 116 Nassau Street, New York City.

POSITION AS TROUBLEMAN; have had seven years' experience as local and long distance telephone troubleman, and also fire alarm troubleman; Minnesota or Dakota preferred. Address BOX 50, care The American Telephone Journal. New York.

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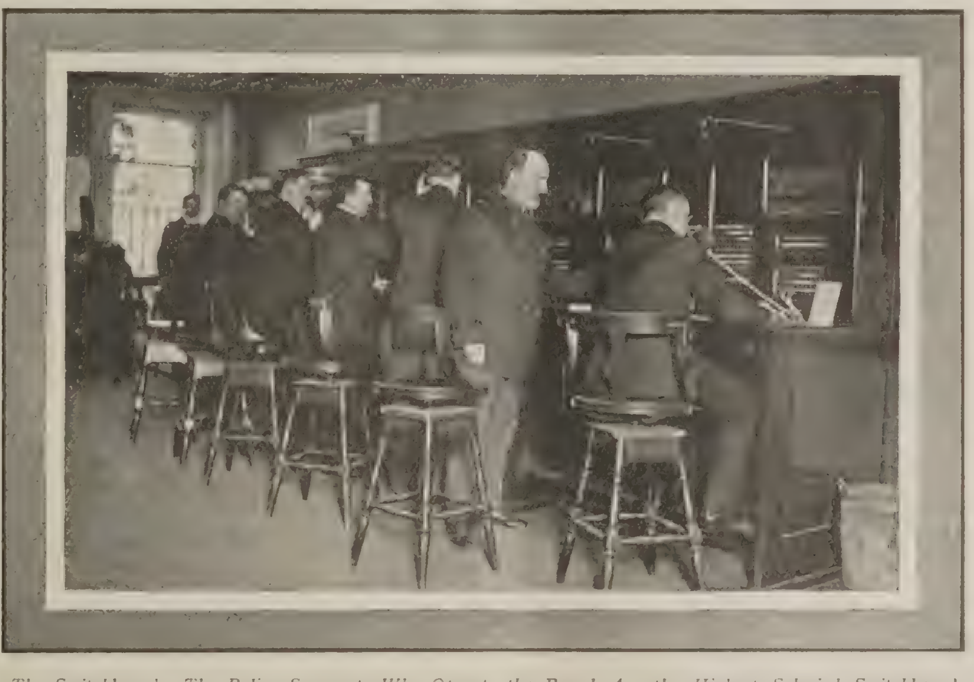
VOLUME VIII *SATURDAY, AUGUST 29, 1903* *NUMBER 9*

NEW YORK'S POLICE TELEPHONE SYSTEM

By Earl Edmunds.

SINCE the announcement that police patrol boxes will be installed in New York, the lay press of other cities has been free in criticising the slowness of the New York Police Department in adopting this system. It has been pointed out that every city of any importance whatever in the country, has for years had a system of police patrol boxes.

As a matter of fact, there is but little room for this criticism. The New York police force is conceded to be the most efficient in this country, if not in the world. And there are two facts, one of them but little known, that have made the installation of street boxes a matter of secondary consideration. One of these is the enormous number of public and private telephones that are in use in New York City. In every part of the city, the police have little, if any, difficulty in finding a telephone which they may use to communicate with the department and with the various precincts, hospitals, etc.



The Switchboard. The Police Sergeants Who Operate the Board Are the Highest Salaried Switchboard Operators in the World. They Receive $2,000 Annually.

The other thing that has helped the police force in its work is the large private system of telephones that is the most comprehensive and valuable adjunct to the working of the department. It is safe to say that no other city in the world has a police telephone system that can compare with the one in New York.

The photograph accompanying this article gives a good view of the police switchboard, which is installed at police headquarters in Mulberry street, Manhattan. There are six positions to the switchboard, and the odd thing about it is, that instead of the regulation "Hello Girl," the switchboard is manipulated by police sergeants who are detailed especially to do this work. There are twenty-six of these policemen operators altogther. The operating force is divided according to the busy and lax periods in the day's work. Thus from eight A. M. until six P. M. there are six operators constantly on duty. From six P. M. until twelve P. M. four operators are required to handle the calls; and between the hours of twelve P. M. and eight A. M. but two operators are on duty. All New York policemen are fat and good looking, and it has been asserted that therein lies the secret of the efficiency of the force. If this is so, the eighteen men who operate the police switchboard must necessarily be the most efficient men on the force. Indeed, the writer accused Superintendent Brennan of purposely selecting the best looking men in the employ of the deparement. Mr. Brennan laughingly refused to either confirm or deny this accusation.

These police operators enjoy the unique distinction of being the highest salaried telephone switchboard operators in the world. Each of them receives $2,000 a year which is the salary of police sergeants in New York. It is necessary, however, to have men of unusual intelligence and reliability at this police board on account of the numerous messages of a confidential nature which are received. The operators also have to be men who are familiar with the working of the department. Each message received is noted on a pad of paper and then handed to another member of the force, who enters the message in a large book provided for that purpose. In this way a complete record of every message received or transmitted is kept in this book.

The department owns its own cable and wire plant. The cables in the Manhattan and the Bronx are all placed in the conduits of the Empire City Subway Company. The instruments and switchboards are the property of the New York Telephone Company, and are leased by the department. The department employs a large force of expert telephone men who look after all repair work, new installations and renewals.

Every station house in Greater New York is connected by a direct line with the switchboard at police headquarters. In several of the precincts there are sub-private branch exchanges, which connect the various departments in these precincts. At police headquarters there are forty stations connected to the main switchboard. This gives a complete inter-communicating system for the official and routine business of the police department. Besides this, there are direct private lines to all the hospitals in the city. If a patrolman on his beat wishes to call an ambulance he goes to the nearest public or private telephone and calls police headquarters through the exchange of the local telephone company. When the operator at police headquarters answers, the patrolman gets connection with the hospital in the locality from which he is calling.

Nearly all the banks in the greater city are connected with the switchboard at police headquarters by direct private lines. In case of an attempted burglary, the bank watchmen can thus call police headquarters without the delay incident to first calling an exchange of the telephone company. This feature of bank protection is one of the important functions of the police telephones.

When general orders are to be sent from police headquarters to the various precincts in the city the precincts are all called through the main switchboard at headquarters, and when they are all on the line the order is then read, each of the operators reading simultaneously the one order so that every precinct in the whole city receives the order at the one reading.

The total number of messages handled over the police telephone system, for Manhattan and Bronx boroughs buring the last year, was in round numbers, 800,000. There was in Brooklyn, a total of nearly 205,000 calls sent and received but in addition to this there were in reality a great many more for Brooklyn has a system of hourly reports from men on posts by means of patrol boxes. The calls from this source alone amounting to over one million and a half. In Manhattan and the Bronx during the last year there were 43,360 calls for ambulances; nearly 14,000 calls for patrol wagons; 15,000 calls for fires; 2,596 general alarm messages for missing persons; 8,791 general messages regarding property lost, stolen and recovered, and 449 general orders transmitted from police headquarters in the manner described above.

In order to handle the vast business of the department, as the city is spread out over such a great area, the police system embodies enough miles of lines to serve a small city with a complete telephone service. In Manhattan and the Bronx there are 401 miles of lines in underground cables, the cables running from two to sixty-two conductors. There are 51 miles of line in four-pair cables on poles and suspended from the elevated railroad strucaure, and 20 miles of line on housetops, leading to patrol wagon stables, etc. In the Bronx are 85 miles of poles, making a total of 557 miles of line conductors in the two boroughs.

M. R. Brennan, Superintendent of Police Telegraphs, New York City.

In Brooklyn most of the wires are over head, there being but 1,200 feet of cables underground. The rest of the wires are strung on poles of the telephone company, and upon the elevated railroad structure. In this borough there is a total of 600 miles of lines of which 412 miles are on poles, 34 miles underground, and 154 miles on the elevated structures. Repeated requests have been made for placing the police wires in Brooklyn underground, and it is probable that this will be done in a very short time. It will add greatly to the efficiency of the service. In the borough of Queens, which is also included in the greater city, there are 116 miles of police lines and 28 stations. Nearly all of the lines in this borough are overhead. In the borough of Richmond there are 59 miles of police lines overhead. This enormous telephone system has been built up, and is now under control of the Superintendent of Police Telegraphs, M. R. Brennan. Mr. Brennan is an old telegraph man, having worked up from the ranks. He has also had a great deal of experience in the telephone business and to him, more than any other one man, belongs the credit of the perfect telephone system of the New York police department. When Mr. Brennan became the Superintendent of the Telegraph Department in 1890, the police department had no telephone system. He saw the need of an adequate telephone system, and has devoted all of his energy since to building up the present plant. The new system of police patrol boxes, which will, doubtless, render the present system doubly useful, will be under the control of Mr. Brennan.

SOLICITING SUBSCRIBERS FOR A NEW COMPANY

By Harry L. Davis.

MANY Independent telephone companies beginning a new business in a city by the installation of an exchange do not appreciate the necessity of engaging competent solicitors. Many companies, when starting the construction of a telephone plant, have engaged local men to do their soliciting. These men, who may have been book agents or insurance men or others accustomed to soliciting in general are perhaps competent enough in their lines, but still are not able to intelligently inform a prospective subscriber just what he can expect in the way of telephone service from the new company. This is a serious drawback to the company, for usually the individual who is most desirous of getting information from a solicitor is the one who, if properly informed, will make the best subscriber.

In order to get business the inexperienced solicitor is apt to resort to getting a class of business which is irresponsible and undesirable. Consequently, when the company commences giving service it does not have on its subscription lists the representative business men of the city, and will struggle along for some time before it is on a paying basis. Histories of Independent companies which have been most successful from the start show that they are the ones that engaged competent telephone solicitors, and by so doing they started with a majority of the best business men in the city as subscribers. Before engaging a man to take charge of the soliciting department a telephone company should assure itself that the man they are dealing with is one whose past record shows him to be capable and honest. If he meets the requirements the whole responsibility for the way the work is done should be placed on him. A good contract agent in charge of the soliciting department of a telephone company is as necessary as a good manager.

The cost of constructing a plant may be greatly lessened by having an honest canvass made before the construction is started. Many companies find, when the time comes for installing telephones, many of the subscribers that had been counted on and had been built to at considerable expense had never subscribed for a telephone at all, and that their names had been brought in by dishonest solicitors. In cases of this kind there has been great expense which will never bring any return to the company. This state of affairs results from engaging men to get business who are not experienced telephone solicitors.

A canvass on the above lines is now being carried on for the Interstate Telephone Company at Austin, Minn., where the writer is now employed. The new company is putting in a central energy system with an all-cable distribution. Austin is a town of 5,000 inhabitants. The Bell company has 320 subscribers. The new company has already secured nearly 500, and indications are that by the time the plant is ready for operation there will be seven to eight hundred subscribers.

STEPS IN THE EVOLUTION OF CIRCUIT DESIGN

ARTICLE XVII.—THE TWO, FOUR, EIGHT AND TWENTY VOLT SYSTEM

By J. C. Kelsey.

THE first feature to consider in a common battery system is the line signal. It is composed of a relay, of sufficient sensitiveness to operate through 2,500 ohms at a pressure of twenty volts. The winding of 80 to 100 ohms resistance has been universally chosen. According to Fig. 109, *LR*, is the line relay, *MB*, the line battery, which, when the receiver is removed from the hook, energizes *LR*, whose contacts close a four volt battery circuit through the four volt line lamp, *4VL*, and illumines it. Four volt lamps are prone to burn out, hence a hundred ohm shunt is put in parallel with the lamp, which does not interfere with its value as a signal. This shunt is of German silver, and is placed on the base of the lamp socket. By means of this precaution a subscriber may call the attention of the operator in spite of a broken lamp. In the battery feed wire to all the lamps, in each position an auxiliary lamp relay is placed, designed to respond to the current, through this 100 ohm shunt. The contacts of this relay close an eight volt battery circuit through the auxiliary lamp, which tells the operator that some one is calling. If no line lamp is illumined, the operator knows that the lamp of the calling party is in operation, so she plugs all the jacks of her position until she finds the party, and reports the trouble for repair.

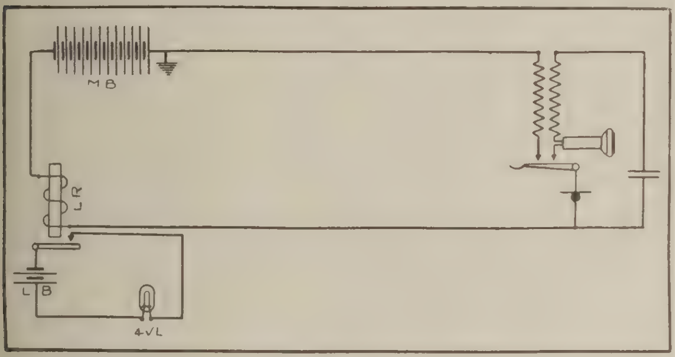


Fig. 109.

According to Fig. 110, we have the main battery, *MB*, which actuates the line relay, *LR*, which allows current to flow through the auxiliary relay, *AR, from battery, 4VB.* The relay, *AR,* closes the contacts of an eight volt battery, *8VB*, through the auxiliary lamp, *8AL*. In a previous paper, the auxiliary relay, *AR*, has been explained, so repetition is unnecessary. In the circuit of the battery, *8VB*, there is a relay, called the night bell relay, which when lamp, *8AL*, is lighted, will be actuated, and will complete a circuit through a thousand ohm bell. This, also, has been described in a preceding paper.

Fig. 111 shows a twenty ohm cut-off relay in place, connected between the sleeve of the jacks and the positive plate of the main battery, which is grounded. The arrow points, *A* and *B*, indicate the immovable springs of the cut-off relay, which keeps the subscribers line normally closed, and opens it when the sleeve of any plug connects the sleeve of the jack and long spring. Then the line is permanently held open. The combination of the cut-off relay, *COR*, and the cord lamp, *4VSL*, may be seen in Fig. 112. The act of plugging in the jack puts *T*, *R*, and *S* in connection with *T'*, *R'* and *S'*. This puts the lamp, *4VSL*, in series with cut-off relay, *COR*, cuts line battery off, and an instant later, restores it, through the medium of the repeating coil in the cord circuit. The lamp is now lighted, dividing the eight volts with the cut-off relay.

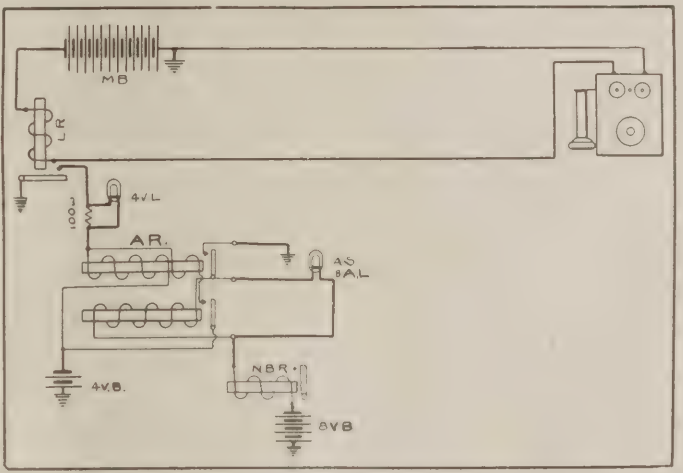
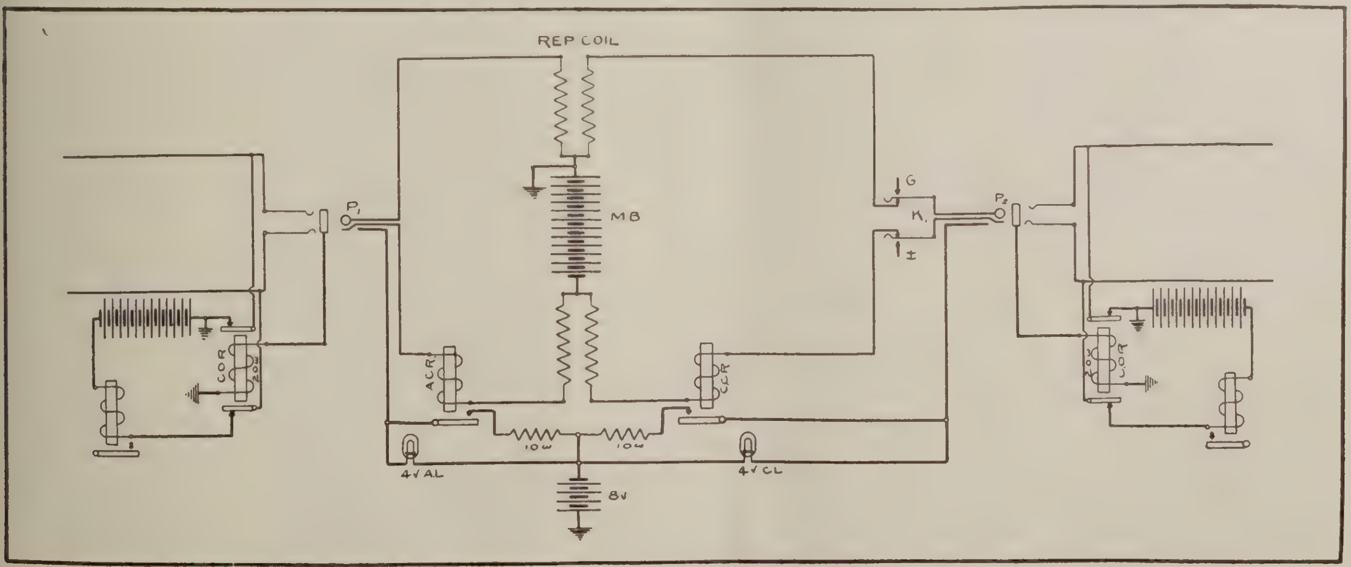


Fig. 110.

If the receiver is off the hook, the relay, *ACR*, of the answering cord, which is in the path of current supply to the subscriber's instrument, is energized. This brings into play the shunt resistance of ten ohms. This does not extinguish the lamp, but

Fig. 113.



dims it, so that with the opalescent shade, it appears to be extinguished. Suppose the subscriber raises and lowers his receiver hook, the relay, *ACR,* is alternately energized and de-energized, which removes and replaces the shunt about the lamp, which flashes, and calls the operator's attention. After the operator learns the desired number, the calling plug is inserted into the jack of that line, and the subscriber's bell rung. (Fig. 114.) Plugging into the jack, lights lamp, *4VCL,* and opens the cut-off relay of that line. When the party answers, the calling cord relay, *CCR,* is energized, shunting the lamp, *4VCL,* and extinguishing it. Both suspensory lamps are out, and both parties are talking. When they are through, and hang up receivers, the relays release shunts, and allow the lamps to light. The operator disconnects.

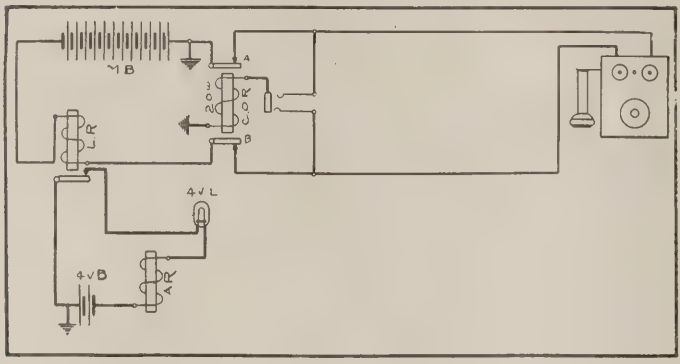


Fig. 111.

In Fig. 114 we have a complete cord circuit. The repeating coil, *RP,* has four windings of twenty ohms each. It is commonly known in the trade as the No. 11 coil, and cannot connect a common battery metallic line with a grounded line without great unbalance. *RK,* represents the ringing key, with its outer springs in connection with the power generator. LK_2 is the listening key, which the operator depresses, when she wishes to put herself in communication with any party on that cord circuit. The outer springs of the key connect to a ring down key, *RDK,* which gives the operator the power of ringing on a line, or order wire, without ringing in her own ear. The inner contacts of the key, *RDK,* connect to the receiver and the secondary of the induction coil. The primary of the induction coil connects with the transmitter, and the two volt battery. In connection with the operating set is a condenser, at *K,* to prevent the bridging of the set from affecting the calling cord signal.

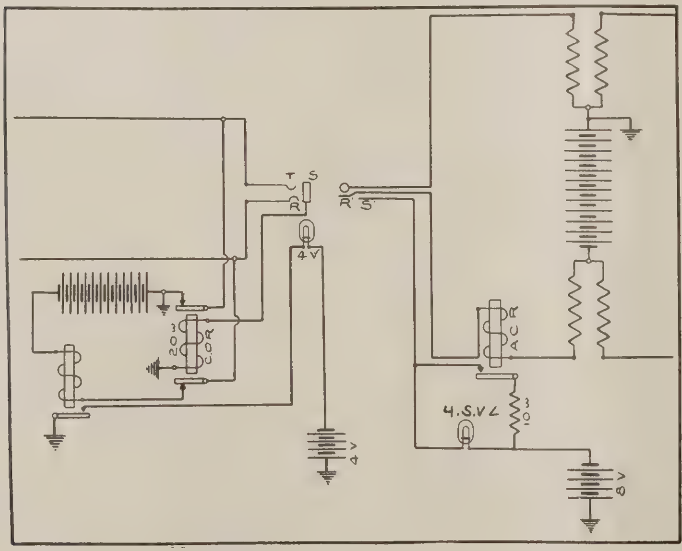


Fig. 112.

P_1 is the answering plug and cord, while P_2 is the connecting plug and cord. Relay, *CCR,* operates the lamp, *4VCL,* with the shunt, 10 ohms, and relay, *ACR,* the lamp, *4VAL,* with the ten ohm shunt. *8VB* is the supervisory battery, 8 volts. *OK* is one of eight or ten keys, which connect the operating set of "A" operators to "B" operators in other parts of the exchange, or in other exchanges.

When the operator finds the number wanted, she tests to see if it is busy. The busy signal consists of clicks in the receiver, caused by battery on the jack ring. To touch the tip of the plug to the sleeve of a jack that is not busy will not affect the operator's receiver. The tip is connected to ground, and so is the sleeve of the jack. Suppose that some operator has inserted a plug in any jack of the desired line, then a change in the condition of the sleeve of the jack takes place. It has now the potential of the battery, *8VB,* owing to the fact that the plug inserted has eight volt potential existing on its sleeve. The self-restoring drop system busy test also is caused by a potential due to the sleeve of the plug. When the operator, in the act of testing, puts the tip of her plug to the sleeve of the busy jack, the current will flow back through the cord circuit, through the quarter winding of the repeating coil to ground. But this gives no click in the receiver, because it is not in the path of current flow. But the repeating coil core is charged with lines of force. As the operator takes away the tip from the sleeve of the jack, the coil discharges, and produces a click in all the receivers connected to its circuits. Suppose that the cord circuit of the busy line contained a lighted lamp. It is lighted by being in series with the twenty ohm cut-off relay. When the operator tests the line, she puts her plug tip to the jack, and places the twenty ohm winding of the repeating coil in parallel with the cut-off relay, for an instant. At each touch the cord lamp receives an extra voltage of two-thirds of eight minus four, or 5 1/3 minus 4, or more than twenty-five per cent. This is enough to strain the lamps severely. Later repeating coils have a much higher resistance, and do not affect the cord lamps particularly.

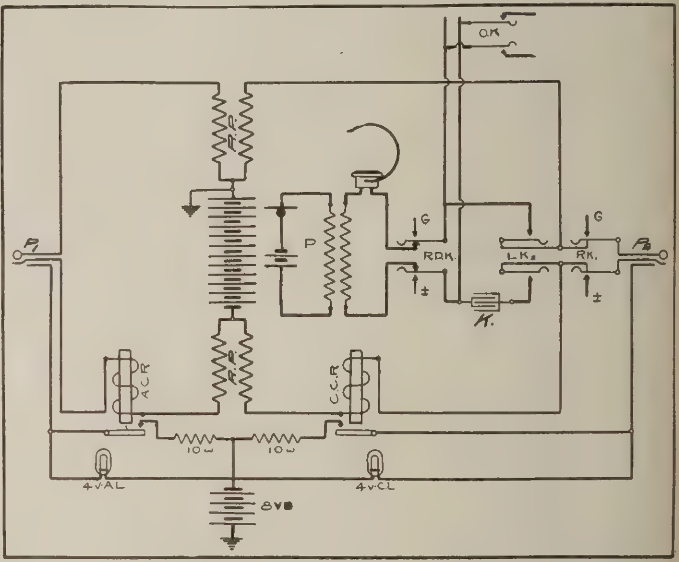


Fig. 114.

AN IOWA COMPANY MOVES ITS OFFICES.

AMENDED articles of incorporation were recently filed by the Davenport & Tipton Telephone Company of Iowa, in which some important changes were made. Heretofore the head offices of the company have been in New Liberty, in Scott County, but by the amended articles the head offices are now moved to Tipton.

The capital stock of the company is placed at 60,000 shares. Of this amount 20 shares valued at $100 each is to be preferred stock, on which a dividend of 7 per cent. annually is guaranteed. The remaining shares are held as common stock. Only $4,000 of the stock need be paid in before the company begins business.

The company was organized a few months ago and was located at New Liberty, a large number of the stockholders residing there. The amended articles are approved by H. R. Chapman, president, and R. A. Nash, secretary.

NEW POLICE TELEPHONE SYSTEM IN NEW YORK

It has been authoritatively announced that after more than seven months' planning, arrangements have been made for installing a police-signal system which will cover all of the Borough of Manhattan. The system will be in operation by October next. No appropriation will be required by the Board of Estimate to carry it through the last quarter of 1903, as the Commissioner has made a new contract for the regular police telephone service, which results in saving about $20,000 yearly, or almost exactly the extra cost of the signal system.

For many years each police commissioner, as he came into office, agitated the question of the installation of such a system, but the funds necessary were not forthcoming. It is said that it was estimated that to equip Manhattan alone, would cost $400,000 or $500,000, if the city constructed its own plant. Manhattan will be equipped first, and then the other boroughs are to be taken up in order, Brooklyn last, because many of its precincts already possess a patrol signal system, though a somewhat antiquated one.

The equipment in Manhattan will consist first of 661 telephones, which are to be placed in iron boxes. Keys are to be furnished each patrolman. The boxes are to be placed by the company in locations indicated by the department, and are to be furnished, installed, and maintained at fixed rates by the company. The telephone boxes will be divided among the various precincts, according to the demand. The minimum in any precinct will be twelve and the maximum thirty-six. The average per precinct will be about twenty.

As far as possible, it is the intention of the department to place the boxes, with the consent of the owners, on the walls of buildings. The boxes will measure about 15 by 18 inches, and will be painted a grayish color. In the start policemen only will be allowed to have keys, but the proposition of giving keys to drug store proprietors and other responsible parties who could be reached at odd hours, is under consideration. The system is to be entirely independent of the existing telephone plant operated by the department.

In each of the station houses a switchboard will be installed upon which will terminate the lines from all the stations in that precinct. The number of stations allowed to each precinct will be as follows:

Pct. No.	Boxes.	Pct. No.	Boxes.
1	26	18	23
2	20	19	36
5	18	20	19
6	15	21	20
7	17	22	26
8	20	24	28
9	22	25	31
10	20	26	30
11	12	28	29
12	18	29	28
13	12	30	25
14	12	31	39
15	18	32	24
16	24	33	31
17	18		

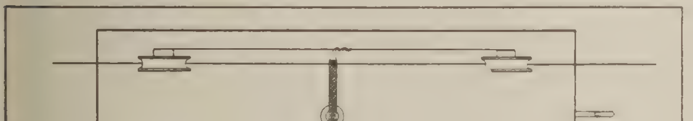
After the system has been installed, the men on duty will be able to quickly get assistance from the station houses and a record of what the officers are doing will necessarily be kept, as the men will be required to report, at regular intervals, during their patrol to the station house, which certainly will result in more faithful patrolling. It is intended later to devise a means of communicating from the station house to the men on duty.

The rental per annum for the 661 stations to be installed in Manhattan will be $20,855.20. Police Commissioner Greene thinks that the installation of the system will add 25 per cent. to the efficiency of the department.

A METHOD OF LIGHTING A DISTRIBUTING RACK

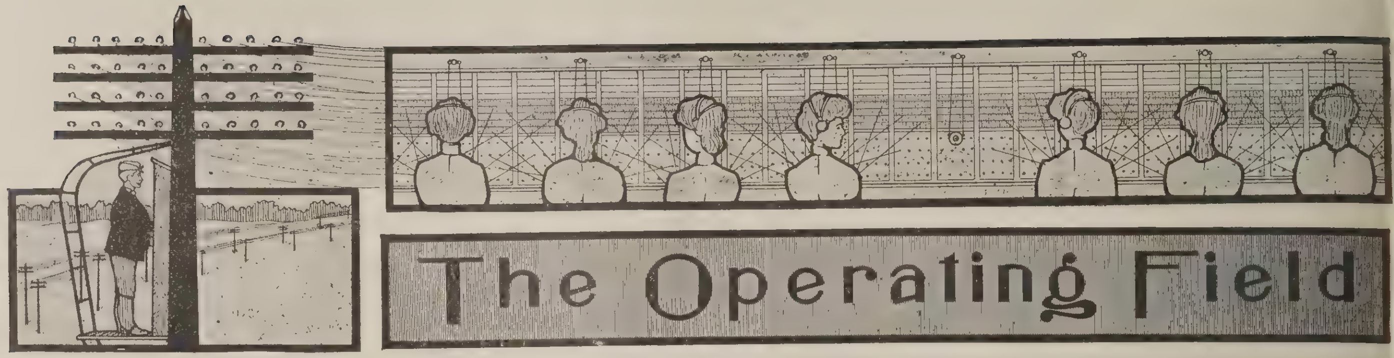
By Frank J. Strassner.

Every switchboard man or wire-chief, who had to drag around after him ten or twenty feet of lamp cord in order to get enough light to work by, will appreciate the convenience of a trolley near the distributing rack to carry an electric lamp, which will provide the necessary light. An arrangement which will he found to work well can be made from a block of pine ¾ inch thick, about 2½ inches wide and 7 inches long. Into each of the corners of this piece, about ½ inch from its sides and 1 inch from the ends, are screwed 4 brass pulleys, such as can be purchased at any hardware store. The pulleys are placed so that the wire running through them will be parallel to the longest side of the car. The lamp cord is carried through a hole in the middle of the board and each of its conductors are soldered to the two proper pulleys. A lamp socket with lamp and guard is attached to the other end of the cord, and a small hook is fastened about 6 inches above the lamp. This may be hooked over a nail on the block when it is desired to have the lamp out of the way. The two wires for the trolley are stretched from one end to the other of the room in front of the rack and are supported by means of porcelain knobs. Four screw hooks may be inserted into the walls, two at either end of the room, wires fastened to each hook and wound around the groove in a knob and made up, the wires being long enough to allow the knobs to come about 6 inches from the wall. The wires on which the trolley is to run, which should be of copper, are then passed through the holes in the knobs, stretched tight and made up. Turnbuckles inserted between the knobs and the hooks will make an arrangement by means of which the wires can always be kept tight and thus decrease the danger of a short circuit. Current can be supplied at one end through a rosette and a piece of flexible cord. The drawing clearly shows the construction of the car.



UNCOMPLIMENTARY TO PARIS SYSTEM.

Inhabitants of St. Etienne, France, have declared the telephone to be the work of the devil. Subscribers having experience with the telephone in Paris are inclined to agree with them, but the St. Etienne opinion is due not to experience but to superstition. A company was about to erect lines passing through St. Etienne when the employees were attacked by a mob with pitchforks and hayrakes. The opposition was so determined that the management ordered the wires abandoned.



The Operating Field

POOR SERVICE IN HAVANA, CUBA.

EVIDENTLY the telephone service in Havana, Cuba, is not the best. The following is an editorial, which appeared recently in the *Havana Post.* The Red Telephone Company spoken of, as one would naturally imagine, is a Bell licensee. The editor captions his comments:

THE BAD TELEPHONE SERVICE.

> The merchants of this city are making a very determined and certainly a most righteous kick against the rotton telephone system of this city. There are no words which are sufficiently strong to describe the service which is perpetrated upon the public by this Red Telephone Company, which unfortunately for the republic has a concession which prohibits any company entering the field and thus giving a good service. Many prominent merchants of the city have sent a petition to the telephone company, stating that if the service is not bettered and immediately, that they will take out their telephones. The people in Havana are the most patient people in the world. For years they have been paying this company the sum of six to eight dollars Spanish gold for the privilege of establishing within their houses a piece of wood and a couple of wires called a telephone, but which only occasionally can deserve the name.
>
> If the management, in the final reckoning of the sins of this world, is made accountable for tempers which have been lost by people who have been fooled into attempting to use the Red telephone, that management is certainly apt to spend some time in the hereafter in an uncomfortable region. People who were never known to swear in their lives have gone all to pieces on attempting to use a Havana telephone.
>
> The management of the Red Telephone Company, whenever approached on the subject of the defects of the system, always have some excuse. Some times this excuse, and at another time that excuse has been given, but the time has passed for excuses, because it has been amply demonstrated that a good telephone system can be maintained here, as the government has one which is amply satisfactory. Instead of having centrals insult you when you ask for a number, the government has gentlemanly young men who attend strictly to their business and simply communicate you with the party you want without asking questions.
>
> The company states they are making improvements, but this has been said months ago and still the same conditions exist.
>
> This is a good time for the merchants of this city to make a good and strong kick. The concession of the Red Telephone Company will expire within a short time and it is seeking to have it renewed. It promises that if the concession is renewed that it will make all kinds of modern improvements, but can it be depended to make them? The company certainly does not appear to have lived up to what it promised when it was given the last concession. If we are not mistaken, in obtaining the last concession this company promised to maintain a satisfactory service, but it has not done so, and if it failed once there is no reason to think that it will not do so again. Would it not be much better to give another company this concession? There are many companies in the United States who have made a success of the business who would be more than glad to have the concession for Havana.

In another later editorial in the same paper this bit of information is given:

> Years ago the Spanish government gave the Red Telephone Company a franchise for seventeen years, the company promising to maintain a satisfactory service and at the termination of the seventeen years the lines were to become the property of the government. This franchise has nearly expired and the company is trying to get it extended, but owing to the indefiniteness about the franchise being extended, the service has been allowed to gradually grow worse and worse, owing to the company fearing that the franchise will not be renewed and the government hence getting possession.

The editor of the *Post* then suggests that the government take up the matter and see if conditions cannot be bettered.

FRONTIER COMPANY VERY PROSPEROUS.

HON. HENRY H. PERSONS, vice-president and general manager of the Frontier Telephone Company, of Buffalo, N. Y., stated that the report that there was a mutual understanding between the Bell Telephone Company and the Frontier Telephone Company had been put in circulation by the agents of the Bell Company and that there was absolutely no truth in it. The rumors had been put in circulation to induce the public from buying Frontier service. All rumors relative to mutual agreements between the companies are also entirely without foundation.

The company now has telephones in the office of every railroad that enters Buffalo, and is connected with the custom house and virtually all other public offices and nearly every important mercantile establishment in the city. Private branch exchanges are daily being installed for customers who started with but one telephone. Telephones to the number of 5,011 are in actual operation and about 30 are being installed each day.

Financially, the plant is exceeding all expectations of its officers, in that, the income thus far has been more than sufficient to pay all operating expenses and fixed charges, after making due allowance for depreciation.

BIG CABLE SHIPMENT FOR UNION ELECTRIC TELEPHONE COMPANY.

A CONSIGNMENT of 60,000 feet of cable will soon arrive in Rock Island, Ill., which will be used by the Union Electric Telephone Company, to extend its service in the tri-cities, Davenport, Iowa, Rock Island and Moline, Ill. The cable will be installed immediately upon its arrival. In Moline the traffic is particularly heavy, the present cable plant being barely able to accommodate the business. It is reported that there are but fifteen pairs left in the existing cables there, so that when these are put into service the company will not be able to accommodate more subscribers until the consignment, which is on the road, arrives. Preparations for extending its toll lines into the country are being made by the company. This work will soon be commenced. Some work is being done throughout the cities on improving and repairing the underground cable systems.

YOUNG MAN BUILDS UP EXTENSIVE SYSTEM.

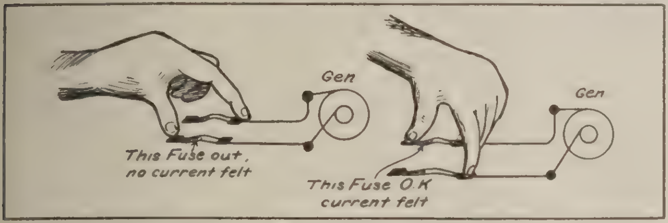
MANY of the farm line telephone systems in the section about Rome, New York State, have been built and maintained by committees which are made up of farmers. In Southern Madison County there is a young man, Mr. Newton, who less than a year ago started an Independent telephone system, which he gradually extended until now it has 131 subscribers and serves about 100 farms.

The system connects the villages of Morrisville, Eaton, Earlville, Randallsville, Lebanon, Georgetown, Georgetown Station, South Lebanon, Poolville, East Hamilton, Hubbardsville, Hamilton, Smyrna, North Otselic, South Otselic, Otselic Center (the four last named places in Chenango County). Extension plans indicate that southern and central Madison County soon will be quite thoroughly covered. The proprietor builds and maintains the lines and sells the instruments to subscribers at $12 a set and charges an annual rental of $10, which entitles the subscriber to service over the entire system without extra charge.

AN EASY WAY TO LOCATE AN OPEN CIRCUIT.

By Fred. Ludlum.

CONSIDERABLE time is often wasted in locating an open circuit in a small exchange. A fuse may be out, the circuit may be open in the cable, the spider wire may be broken, the line wire down, the duplex severed, or a wire cut in the instrument. Working with a test set, in a case of this kind, is apt to be a long and tedious proposition. The writer suggests the following method, without a test set, which, though quite simple, will probably prove useful to those who have never tried it. When a line tests open, have the switchboard operator throw the ringing generator on the line, by placing a calling plug in the appropriate jack and throwing the ringing key, which will have to be fastened back. If an American Electric Express switchboard is used, the spring may be removed from one of the plugs, so that it will stay in the ringing position, and this plug used for the purpose. Now go to the terminal room and feel across the line, with the thumb and forefinger, before it passes through the heat coils or fuses, and if the current is felt the circuit is continuous to that point. Feel then, on the line side of the fuses, and if no current is perceived, the fuse is open, and by using the fingers as indicated in the drawing the faulty fuse may be located. If current it felt beyond the heat coils, the line may be followed on out until the break is located. As soon as the fault is repaired, the buzzer on the switchboard operates and the subscriber's bell rings. This notifies the operator that the trouble has been repaired. When the subscriber answers, the operator can inform him that his line is now in service.


Gen
Gen
This Fuse out, no current felt
This Fuse O.K current felt

H. H. ROBINSON, MANAGER OF ILLINOIS.

H. H. ROBINSON, general manager of the United States Telephone Company, the long distance company of the Federal telephone system, lately handed in his resignation, to take effect September 1. He has accepted the general managership of the Illinois Telephone & Telegraph Company, of Chicago. The new exchange will open September 15, installation of instruments beginning Monday next. Mr. B. Overly, now general superintendent of the United States Company, has been appointed general manager, to succeed Mr. Robinson.

TELEPHONE POLES AS GUIDE POSTS.

THROUGH the Western States, where the farm houses are not so close together as they are in the East, telephone pole lines often serve as a guide to those who travel from one town to another and are not familiar with the country. When there is but one line between the towns the traveler is told, by those who know, to follow the line until he reaches his destination. When there are several lines that lead out of the place, from which the traveler starts, and go to different towns, he is told to follow the line with the tall poles, or that having a certain kind of cross arm or type of insulator, as the case may be. In this way the telephone line serves as a succession of guide posts.

The number of poles between one place and another and their uniform spacing aid one materially in quite accurately determining distances. If he knows the number of poles to a mile, on the line in question, and counts them as he drives along, he can, at any time, tell how far he is from his destination, and by these same means can easily tell how much time it takes him to cover a mile. Where the telephone company has numbered poles, distances can thus be measured with very little effort.

ERIE R. R. TO INSTALL TELEPHONE SYSTEM.

E. P. GRIFFITH, of New York, superintendent of telegraph on the Erie road, has recently been experimenting with a telephone system that will soon be installed over the entire railroad.

The tests made so far have proved thoroughly satisfactory, it is said, and despite the noise caused by the telegraph currents, conversations were easily held and voices clearly distinguished. The system is to be an auxiliary to the telegraph department and will be of undoubted aid in railroad operation. It may also be used as a safety appliance in case of any possible misunderstanding as to orders.

TELEPHONES FOR SPRINGFIELD STREET RAILWAY.

SUPERINTENDENT GUNN of the Appleyard System of Traction Lines, of Springfield, Ohio, recently announced that his entire system is to be equipped with telephones. The instruments will be placed in the vestibules of the cars and the motorman, when he wishes a connection with the dispatcher, will insert a plug on the end of a long rod, into a jack attached to one of the trolley poles along the right of way. The motorman will not have to leave his position on the car in order to call the dispatcher. Jacks will be located about 1,000 feet apart. The exchange will be maintained in Springfield.

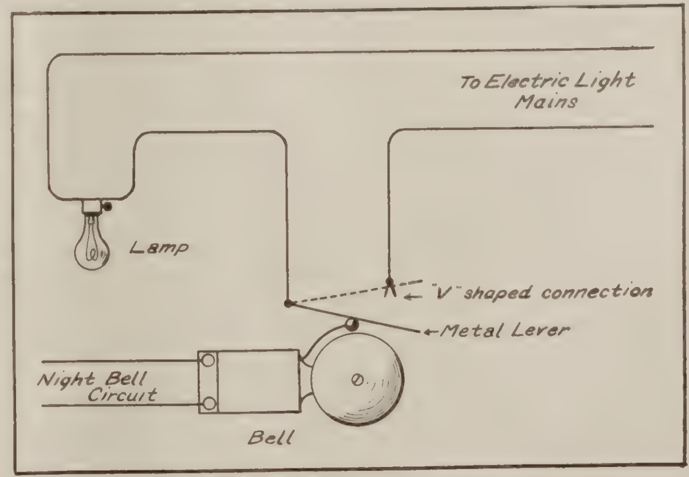
FRENCH EASILY UNDERSTOOD OVER THE TELEPHONE.

TELEPHONE employees in Paris have discovered that French is more easily understood over the telephone than English. In telephoning between Paris and London during a storm conversation in English is impossible, but French is easily understood because it has not so many sibilant sounds and unequally accented syllables.

NIGHT BELL RINGS, LIGHT ILLUMINATES.

By S. P. Williamson.

OFTEN it is desirable to have an electric light, in the switchboard room, illuminate when the night bell rings. This not only makes the room light, so the operator can quickly answer the call, but in some cases where the operator is a sound sleeper it will aid to awaken her quickly. The simple arrangement herewith shown will automatically perform this function. Referring to the drawing: A metal lever, about 6 inches long, is nicely balanced in a vertical position and is placed in such a way that when the bell is actuated the level is knocked into a horizontal position, where it is received in the V shaped connection indicated in the drawing. The lever, which is really a blade of a switch, when it falls into the horizontal position closes the lamp circuit and lights the incandescent lamp. If necessary a piece of wire can be soldered to the bell hammer to give it a longer stroke. The entire apparatus may be placed on the top of the switchboard.



The Editor's Page

AN EXPENSIVE POLICE TELEPHONE SYSTEM.

IT is announced that the Police Department of New York City has contracted with the New York Telephone Company for an exclusive telephone system. Heretofore when an officer wished to communicate with his precinct station he gained the connection by means of a telephone in a drug store or elsewhere. This, obviously, was a primitive method. We consider it surprising, that the police, on whose prompt action, millions of value and hundreds of lives may depend, have been unable to secure appropriation to install the system needed.

It is, indeed, high time that modern appliances were given to the police, for it is as absurd to expect prompt and efficient service without the best means of intercommunication, as it would be to arm the corps with blunderbuses in a campaign against a mob with Winchesters. So, of the many progressive acts of Commissioner Greene, there are few that can be of more value in improving the department efficiency.

As currently reported by the daily press, the New York Telephone Company will supply 661 police stations. Each station will consist of a cast-iron box, something after the pattern of a fire-alarm box, placed at a convenient point, secured to a lamp post or exterior of a building wall. The box, provided with a locked door, will contain a transmitter and accompanying apparatus, a receiver, and a gong or other signal whereby the patrolman can be called. A certain number of stations will be distributed in each precinct, and from each one a line will extend to the precinct station and terminate in a switchboard. Thus a policeman, on reaching a box, can be in instant communication with his captain. From each precinct switchboard it is expected that trunk lines will run to police headquarters, so that the entire borough will be under telephone surveillance.

As a design to provide the department with a modern telephone system fully suited to its needs, the plan proposed seems to have been carefully thought out, and it is only when one begins to consider the *cost* of the proposed installations as given by the newspapers, that suspicion is aroused. From the press accounts we are told that the reason why the police department have been so long without telephone facilities, is on account of the enormous expense required to install a satisfactory system. The estimates given in the papers vary from $400,000 to $500,000. The present plan calls for 661 telephones, and if this plan is, in the opinion of the Commissioner, sufficient and satisfactory, he presumably obtained estimates on a similar installation. While the newspaper reports do not specifically state in so many words that an estimate of one-half a million dollars is required to install 661 telephones, they are so worded as to leave upon the reader's mind a very distinct impression to this effect. If $500,000 is estimated as required for 661 telephones, the rate per station would be $756.00. Truly, this is an unheard of amount. It is conceded by all that New York is the most expensive city in the country to telephone, and had the New York Telephone Company proceeded on the basis of $750 per station, it would have been compelled to insert upwards of $60,000,000 in the plant it now claims to operate. On the contrary, the experts of the New York Telephone Company recently showed that the average cost of installation in New York was approximately $150 per station. This expense does not include conduit, which is owned by the Empire Subway Company, and rented to the telephone company. In such cities as Cleveland, Baltimore, Buffalo, Columbus and Toledo the Independent companies have installed plants, including conduit, at from $90 to $130 per station. But even on the basis of $150 per station the 661 police telephones would only cost in round numbers a hundred thousand. Now, the annual rental to be paid by the city to the New York Telephone Company is stated to be $20,853.20, or, in other words, about 20 per cent. on the cost of the plant, if reckoned on the basis of the probable cost of telephone stations in New York. But the cost of the police outfit will be much less. In the first place, the $150.00 basis recognizes prices for equipment which formerly were much higher than at present. The sub-station in its iron box will be presumably decidedly cheaper than the average sub-station equipment of to-day. The number of boxes to be installed in each precinct is reported to be as in the table in the article, in this issue, describing the system.

A PROBABLE FIFTY PER CENT. ON THE INVESTMENT.

This shows the highest number of stations to be 33 in one precinct. Hence a 50 line switchboard would be ample capacity and to spare. There is, therefore, no expensive multiple to install. Considering the size of the precincts in Manhattan, it is probable that the average length of line from each station to the precinct station will not be over three-quarters of a mile. With present prices a rough estimate on a liberal basis, the cost of installing police boxes would be as follows:

Box	$12.50
Connection to cable	10.00
Cable wire	30.00
Switchboards	10.00
	$62.50

For the 661 stations, it is reported that the New York Telephone Company is to receive $20,855.20 per annum, or an average of $31.50 per station. This is fifty per cent. on the probable investment. Now the New York Telephone Company *does not operate any of the switchboards.* It merely furnishes, installs and maintains the apparatus, which is, in all other respects, cared for by the police.

In Cleveland, Buffalo, St. Louis, Rochester and other large cities the Independent telephone companies are furnishing full, unlimited service on single lines for $48.00 per annum, and making money thereby. If full service can be supplied for $48.00, what are the probable profits on a mere rental of apparatus at $31.50?

The Commissioner is quoted as having the benefit of Prof. Sever's advice in preparing the plans for the police system. Now, Prof. Sever has recently appeared as a Bell expert, and we fear if his are the estimates of cost referred to by the daily press, he has either been sadly misquoted, or has grossly exaggerated. We think that if the Commissioner had laid before New York's financial officers a plan to make 50 per cent. per annum on the capital, on the security of the City of New York, he would have had little trouble in getting $400,000 or $500,000.

But when all is said and done, it is a kind of a tempest in a teapot; $20,000 more or less in New York's annual expense matters very little. Nor is it vital whether the city pays $20, $40, or $60 per station for the police telephone. The real question is the existence of such a deplorable state of affairs as permits the monopoly of a public service to such a degree as will make a transaction as grossly extortionate as this possible. New York, the chief city of the country, is still completely within the grasp of the Bell interests. Almost every other city has seen the advantage and realized the benefits from telephone competition.

CONTEMPORARY CROSS TALK

By "The Listening Key."

ANY system or method of working that will make for a more even distribution of the traffic will have a very large value on that account alone, apart from any other advantages that it may have. It has taken us a long time to get away from the delusion of considering the subscriber's line as the unit of telephone work. Many of us have not got very far from that mistaken idea yet, though undoubtedly all will have to abandon it in time, for the future of telephone work is going to be very different from the past. If not, telephony would have to be entirely distinct from any other great industry. Its distinction really lies, however, in having been far more rapidly developed, both scientifically and commercially, than any other of the great industries to which steam and electricity have given birth. With the possible exception of electric traction no other branch of the industrial applications of electricity has made history so rapidly as telephony. We have by no means reached the limits of progress yet. We have abandoned and changed many of our early notions, even some of our most cherished principles, and we shall yet abandon many more. The principle of considering the subscriber's line as the unit dies hard, but eventually it will have to die and be buried. The telephone manager of the future will think more of distributing his traffic than of distributing his lines, and in order effectively to distribute his traffic he will have to adopt different methods of working from those he has used in the past.

What Has Been Done

AT one time the subscriber's line was a solid unit right up to the switchboard. Hideous confusion resulted, and it became necessary to provide means for readily changing the connections between the switchboard lines and the outside lines. The main distributing frame was evolved and comparative peace was attained. It soon became apparent, though,—it was even apparent before the main distributing frame appeared on the scene—that, although the subscriber's line was a tangible unit, the amount of work it gave was not. The lines were connected to the switchboard on the average principle, so many to each operator. But the work flowing from the lines did not average at all, some positions were quite idle while others were over-busy. This state of affairs called for a remedy, and a remedy was produced in the shape of the intermediate distributing frame. The intermediate distributing frame enables you to interconnect any multiple line (and its corresponding subscriber's line) with any answering jack on the board. If you find that a position is overworked you can take some of the lines away from that position and terminate them at another by a simple change of connections at the intermediate frame. The intermediate distributing frame, in short, gives you the power of distributing your lines in any proportion per position within the range of the number of answering-jacks fitted per position. It is used to equalize the load per position, as nearly as possible, by distributing a certain proportion of each class of line to each position.

What Will Be Done

BUT the intermediate distributing frame, after all, distributes lines, not traffic. The distribution must necessarily be done by trial and error, by experiment and guesswork tempered by observation and experience. Conditions change very rapidly in telephone work. The line that is idle to-day may be busy to-morrow and the line that is busy to-day may be twice as busy next week. These changes do occur very frequently and may very easily occur in groups, so that the intermediate distributing frame often has its work to do all over again and seldom knows where it is at. Further than this, the character of the traffic may undergo sudden and very great changes at any hour of the day or on any particular day. Sudden changes in the course of affairs will instantly be reflected in the telephone traffic. A panic in stocks, a disaster at sea, any grave accident or crime, will call out a rush of traffic from lines normally quiet and make the busy lines busier. A hot wave will send up traffic because people object to moving in hot waves, a heavy storm will cause a rush to the telephone, a blizzard will cause the residence telephones to come vigorously into use. Special events will interest special classes and cause local and individual spurts of telephone traffic. As the use of the telephone becomes more general—and it is going to become far more general than it is now—all these conditions will become accentuated and the handling of telephone traffic will become a very much more complex problem than it is now. The load line of a telephone exchange, accurately plotted, instead of representing a couple of huge majestic waves will often have more the character of what mariners call a "confused" sea. Under these conditions telephone managers will necessarily demand or devise a more ready and elastic method of distributing traffic than they now possess.

How Will It Be Done

IT must not be forgotten that the telephone user remains a unit, acting entirely by himself, and to him each call he makes is a unit. Telephone calls may be coming into the exchange at the rate of a thousand a minute, but each caller is possessed with the idea that his particular call is the only business the telephone company has on hand for the moment; he thinks nothing, as he knows nothing, of the other nine hundred and ninety-nine and will brook no delay. His call must be answered promptly and must be handled promptly under any and all circumstances. And, as we have seen, these circumstances may vary very widely from day to day and from hour to hour. Any measure for distributing the traffic must be taken with the condition that the standard of efficiency of service remains unimpaired. While this makes the problem more difficult, in a certain way it makes it easier, for we have a fixed standard that must inflexibly be lived up to. How then shall we distribute the traffic while retaining the efficiency of the service at its present high standard?

PRIVATE SYSTEM FOR COAL COMPANY.

THE Pittsburg Coal Company is planning for an extensive telephone system to reach all the mines in the control of the company. The line will be a private one and in no way will it be a competitor of the two big telephone interests in Pittsburgh. The line is to extend to more than 100 mines of the company, crossing five counties in Western Pennsylvania and the Hocking Valley district in Ohio. The system will be conducted as a regularly formed corporation to comply with all of the requirements of the law.

The equipment, maintenance and operation will be in charge of the company which will have its own exchanges and operators. The sole object of the system is to expedite the business of the Pittsburgh Coal Company. The line is to be restricted entirely to the uses of the company. An application was made recently for the Montour Telephone Company, and the following, all officials of the Pittsburgh Coal Company, are named as incorporators: Vice-president W. R. Woodford, Secretary Francis LeMoyne, and Superintendent of Mines G. W. Schleuderberg. The application calls for the erection of telephone and telegraph lines and exchanges in Pittsburgh and throughout the counties of Allegheny, Westmoreland, Fayette, Washington and Greene, with the right to make connection with similar lines in this and other States. The line is to reach the company's coke field in Fayette county.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

A DISTINCTION BETWEEN RURAL AND URBAN HIGHWAYS.

THE case of Weeks vs. New York & New Jersey Telephone Company has veen decided in favor of the company by the Supreme Court of New York. The complaint alleged the plaintiff's ownership of premises at Bayside, in the borough of Queens and city of New York, including a portion of the street known as "Bell Avenue," the incorporation of the defendant, and its intention to erect its telephone lines through, over, under, or along some portion of the plaintiff's property included in Bell Avenue; and asked for an injunction to restrain the proposed action of the defendant. A temporary injunction was granted, motion made to continue it, and this motion was denied. From the order denying this motion, the plaintiff appealed.

The court affirmed the order and denied the injunction. The complaint failed to allege any damage to the plaintiff, except such as might be implied from the allegation that the defendant proposed to erect a line upon a public highway, the bed of which was owned by the plaintiff. The court said that it was not its policy to decide upon motion so important a question as the pleadings presented, especially when the gravity of the question arose from differing opinions. It called attention to the New York decisions recognizing a distinction between rural highways and city streets and holding that the easement in the latter was the greater, so that poles that would be an additional burden on a country road might be no burden in the city streets. Since the court was not informed whether Bell Avenue possessed the characteristics of a built-up city street or was to all intents and purposes merely a rural highway, although in the city of New York, it was unable to decide which rule applied, and therefore dismissed the injunction. Justices Hirschberg and Jenks dissented, the former saying that he considered the erection of poles in streets, urban or rural, for telephone purposes, a use for other than street purposes and therefore enjoinable. Weeks vs. New York & New Jersey Telephone Company, 83 N. Y. Supp. 678.

IS A HOOK JOINT A MISCONNECTION?

JOHN W. KENNEDY, a Rochester, N. Y., manufacturer, is suing the Rochester Telephone Company for damages because a defect in the telephone connection prevented him from notifying the fire department of a fire in his dwelling. The plaintiff alleges that he put the Rochester telephone in his house April 1st, last, subscribing to the usual contract. On April 30, 1903, a fire, not of incendiary origin, occurred in his dwelling. The fire started in the attic, was immediately discovered, and when an attempt to send in an alarm of fire to the department was made, the telephone did not work. During the delay thereby caused, the fire gained a considerable headway and spread until much valuable property had been destroyed. An alarm being sent in to the proper headquarters by other means, the fire department responded and extinguished the fire. The plaintiff claims that the fact, that the telephone had been acting irregularly, had been reported to the company a few days before the fire, but that the latter sent no one to repair it. After the fire an employee of the company discovered, it is alleged, that the joint or connection had been made in the wiring on the outside of the house by loosely hooking the ends of the wire together without twisting, soldering or insulating tape or other means to make a permanent contact. The making of the hook joint or connection is alleged to have been gross negligence.

The telephone company relies upon a contract signed by the plaintiff as relieving it from liability because it is therein provided that "said lessee hereby assumes all risks of misconnection, mistakes or errors in receiving, transmitting, or delivering messages." The plaintiff contends that the way the wires were joined constituted a negligent installation of the telephone, rather than a misconnection. The amount sued for is $500.00. This case is similar to that of Stone vs. The Southern Bell Telephone & Telegraph Company, tried in the United States District Court at Savannah, Ga., in which a jury returned a verdict for the defendant.

FRANCHISE NOT VIOLATED.

THE Illinois Western Telephone Company has gained a legal victory over the city of Rushville, Ill., in justice court at that place. The question at issue was whether or not the Illinois Company had, by an alleged violation of its franchise, forfeited its right to conduct a telephone exchange in Rushville. The city alleged that the company had done this and sought to recover $200 from the company for violation of a resolution adopted by the city council, that body having forbidden the company to make any further improvement to its lines in that city. The verdict of the city was in favor of the company.

TWO SUITS AGAINST THE CHICAGO TELEPHONE COMPANY.

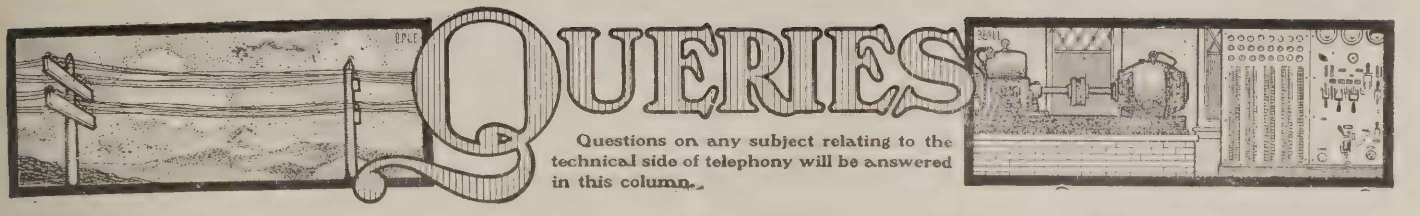
THE Chicago Telephone Company is being sued by two young ladies who claim to have been injured by the Company. Miss Irene Fritz, an operator, says she received a severe electrical shock while working at a switchboard. Miss Esther Oppenheim asks $50,000 damages because she received a shock while attempting to use a telephone that was out of order.

LITIGATION IN PENNSYLVANIA.

THE United Telephone and Telegraph Company, of Pennsylvania, has secured a temporary injunction and applied for a permanent one, enjoining the borough of Ridley Park, Pa., from cutting down the poles and wires of the company, as the company alleges the borough threatens to do.

CONSOLIDATES SOUTHWESTERN INTERESTS.

OFFICIAL announcement comes from San Antonio, Texas, to the effect that H. E. Huntington has acquired the Independent long distance telephone lines in Texas, Louisiana, and Indian Territory, compromising over 1,000 miles, the price paid being $400,000. The deal also involves all of the Independent local exchanges with which the toll lines connect, the total consideration being approximately $3,000,000. A score or more of the principal cities and towns of Texas and a number of towns in western Louisiana and Indian Territory have Independent telephone exchanges, which will become a part of the new system. It is reported that Mr. Huntington will extend his operations to Oklahoma and Arkansas, where there are extensive Independent telephone interests. It is also announced that $400,000 will be expended immediately in extending the existing toll lines.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

HOW TO MAKE A GROUND.—(178.)

What do you consider a suitable method of getting a good ground for a bridging telephone on a grounded line? B. F. C.

The best method will depend upon conditions. You do not say whether you are in a city or out in the country. If you are where you can get to a water pipe that will probably give you the best ground, provided you make a good connection with the pipe. If you can solder the wire to the pipe it will give an excellent ground. If you cannot do this scrape the pipe bright for an inch of its length, and wrap around it for this distance, the wire which you wish to ground, making the wraps close together. This sort of a connection must be watched, as it is bound to corrode and give trouble. Be careful of grounding on a gas pipe, as the meter may be taken out, which will leave you high and dry. If you are out in the country, a lightning rod will usually be found a good ground, or if the well has an iron pipe running into it this may be used. The underwriters recommend the use of a tinned copper plate, surrounded by pea coke or charcoal, buried deep enough in the ground to insure its being in permanently moist soil. A 3/4 inch iron rod with the ground wire *soldered* to its upper end, driven far enough into the earth to insure its always being in permanently moist soil, will probably answer your purpose as well as any arrangement you can make. If there are several grounds available use them all, so that if the wire to one breaks you will have the others to fall back upon. If the soil is very dry it is a good plan to keep the soil, around the ground plate or rod, moist artificially.

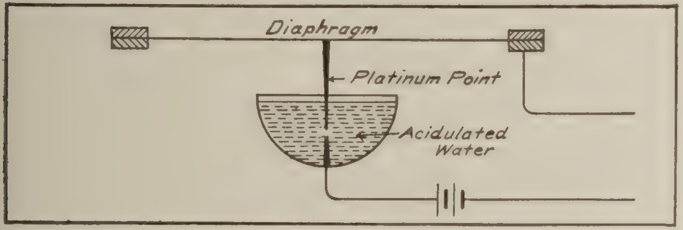


Fig. 183.

STRENGTH OF IRON WIRE.—(179.)

How many pounds will a piece of No. 12 iron wire hold up? G. E. V.

The tabulated breaking weight of No. 12 iron wire is 495 pounds.

STANDARD FRAMING OF POLES.—(180.)

What measurements do the big telephone companies use for cutting the gains for the cross arms in their poles? F. E. O.

Fig. 180 answers your question. Some companies space their crossarms 24 instead of 20 inches between centers, as indicated in the drawing shown.

RECEIVER OUT OF ORDER.—(181.)

Three weeks ago lightning hit our line and burned out some of the fuses, and since then my receiver has not seemed as good as it was before. Do you think that the lightning could have had anything to do with this? As far as I can see it looks all right. H. M. D.

It is quite possible that the lightning may have demagnetized your receiver, as this has frequently happened. If this is the case, about the only thing that you can do is to send it to the factory where they can fix it up for you. It may be that the diaphragm sticks to the magnets. This would cause it to give unsatisfactory results. Many times this may be cured by simply reversing the diaphragm. If this does not do the work, insert a paper washer between the diaphragm and the hard rubber seat of the receiver shell upon which the diaphragm normally sets.

INDUCTION COIL IN TRANSMITTER BASE.—(182.)

Can you tell me whether there was any reason for enclosing the induction coil of local battery telephones in the base of the transmitter arm other than convenience and the protection the iron case would afford the coil. Is there any magnetic reason why the coil was so enclosed? A. F. D.

It is claimed that the iron case around the coil renders the magnetic circuit more complete, and thus increases the efficiency of the coil. On the other hand, it is claimed by some that the losses due to eddy currents set up in the iron case more than offset the gain in a more complete magnetic circuit. It has been found experimentally that the iron case has very little appreciable effect on transmission whether it be used or not.

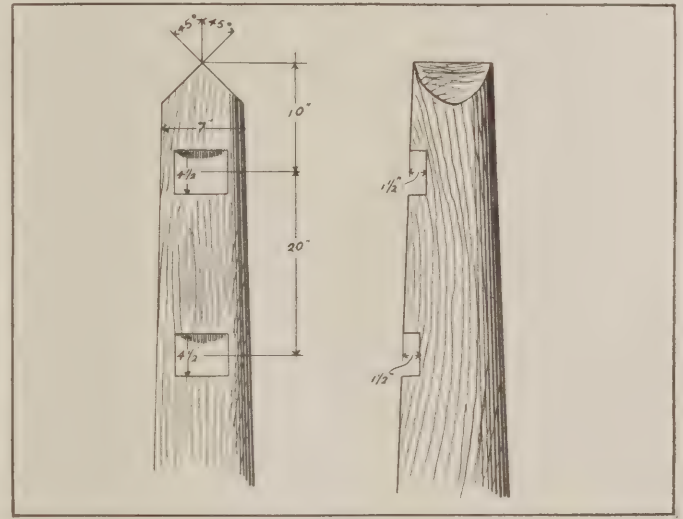


Fig. 180.

WATER TRANSMITTER.—(183.)

What is meant by a water transmitter? E. O. D.

This was an early type of telephone transmitter which was evolved by Elisha Gray. The device never came into general use, as it was scarcely better than the, then used, magneto transmitter. Fig. 183 shows diagrammatically the construction of the instrument. The lower platinum point was stationary and the upper one was attached to the diaphragm. As the diaphragm vibrated, due to impinging sound waves, the distance between the two platinum points varied accordingly. This produced proportional current variations in the circuit. These acted in the usual way upon the receiving telephone.

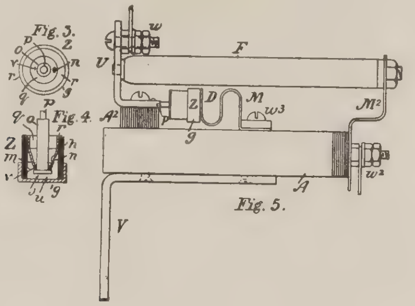
CONSTRUCTION OF A MAGNETO SWITCHBOARD.

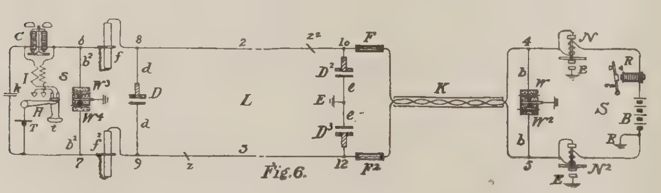
A SLIGHT typographical error has come to light in the article, "Construction of a Magneto Switchboard," which appeared in our issue of August 22. The following statement was made: "Following the usual and natural practice, the ringing key is connected to the back cord, which makes that the calling cord." Obviously it is the front cord that is thus referred to, as the back cord is almost invariably used for answering.

PATENTS ISSUED

PROTECTIVE DEVICE FOR TELEPHONE CIRCUIT.

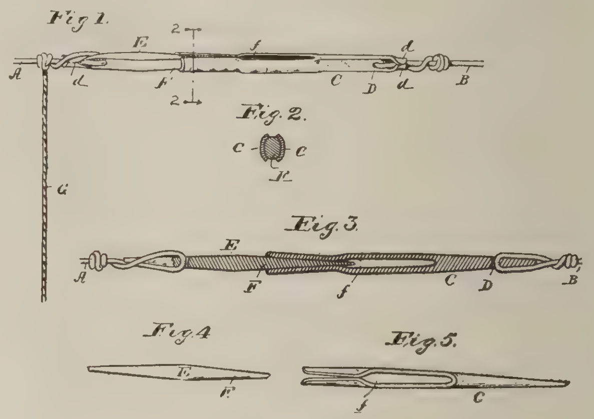
Almon B. Stetson, of Malden, Mass., patents (No. 736,033) a means for protecting telephone circuits and apparatus, and assigns his patent to American Telephone and Telegraph Co. The object of this invention is to afford a better means of protecting telephone circuits from injury due to sneak current crosses with high potential lines of lighting discharges, than has been afforded by any apparatus in the past. A part of this invention relates to the method of introducing the specially organized fuse device patented by Wilton L. Richards, mentioned elsewhere in this issue. The method of arranging the protectors is shown in Fig. 6, while the detail of the protecting apparatus is given in Figs. 3 and 5. In Fig. 6 R is a relay and B is a battery which symbolizes the central station. K is a cable through which any number of telephone lines may pass. L is a pair of open wire lines, while the subscribers substation is represented by the ringer C, condenser k, transmitted T and hook switch H. The method of protection specified in this patent consists in bridging a pair of open space cutouts W^3 and W^4 across the line near the subscribers instrument. A specially organized fuse is then inserted in the line at f and f^2—then comes the specially designed open space cutout, bridged across the line at D. The general arrangement of this protector is shown at Fig. 5, while a detail of the heat coil is given in Figs. 3 and 4. Where the open wire joins the cable a second pair of the short circuiting device is bridged across the line. There are two fuses f and f^2. At the central station a pair of open space cutouts W and W^2 are inserted. This invention differs from the former method of line protection by inserting a greater number of open space cutouts and fuses by using the special fuse of the Richards patent and in the construction of the heat coil, a protective device, shown in Fig. 4, consisting of a conductive sleeve o standing upon a metal cone which is filled with fusible solder. When the heat coil operates the solder melts and the electrode j is forced into contact with cup g, thus grounding the circuit.





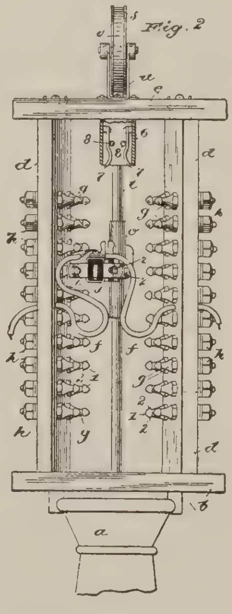
NOISE AND LIGHTNING ARRESTER FOR TELEPHONE WIRES.

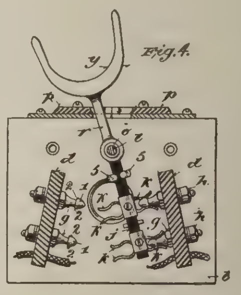
Alexander Stiles, Martinsville, Indiana, patents (No. 735,839) a lightning arrester for open wire lines. The object of this invention is to provide a device which can be manually operated to protect telephone lines in case of a thunder storm. The device is illustrated in Fig. 1 to 5 inclusive. A sectional view is shown in Fig. 3 from which it will be seen that there is a kind of a spring jack C into which a plug F can be inserted. The line wire A is attached to F at E and the other end of the line wire B attached to C at D. Under ordinary circumstances the plug F, inserted into the jack C and the line is continuous. A rope G is fastened at the point A and upon the approaching of a thunder shower a pull upon the rope will open the line.



ELECTRIC SWITCH.

Cornelius C. Gould, of Philadelphia, Pa., patents (No. 735,966) an electric switch and assigns his patent to Maxwell Sommerville and Lewis B. Mathias, of Philadelphia, Pa., Walter C. Timm, Jr., and Devere Worrell, of Morton, Pa., and William W. Morton, of Camden, N. J. The object of this device is to provide a switch whereby a large number of circuits may be rapidly and conveniently interconnected. The invention is shown in elevation in Fig. 2 and in plan in Fig. 4, as arranged to be applied to a telephone substation. There is a vertical rod i Fig. 2, which carries a slide o with supporting hook switch y. It is obvious that this circular rod will enable the hook switch to slide either up or down, or turn to and fro horizontally. In order to hold the

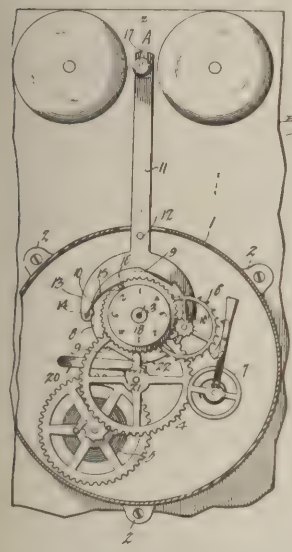


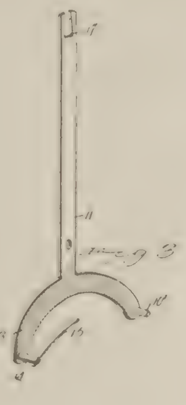


switch securely against its contacts the spring *t* is provided, which pulls upward through the medium of ribbon *V* which is placed upon the top of the enclosure which holds the apparatus. Along each side of the insulating box *d* any number of contacts *g* may be arranged (see Fig. 2 and Fig. 4). These contacts are knob shaped and are arranged to match corresponding springs *k* which are placed upon the hook switch as in Fig. 4. Thus it will be seen by either raising or lowering the switch or swinging it to and fro any combination of circuits can be switched together.

SELECTIVE SIGNAL DEVICE.

Burnett Hamilton, of Lawrence, Kansas, patents (No. 736,249) a telephone selective signal device. The object of this invention is to provide an improved method for operating party line stations by furnishing a means whereby only the bell of the party desired is rung. This invention is illustrated in Figs. 1 and 3. In Fig. 1 it will be seen that the clapper *A* of the call bell is surrounded by a lever *11*. This lever is shown in detail in Fig. 3 and is arranged to work in connection with a clock work escapement which is enclosed in a box *1*, which may be screwed upon the face of a substation set. Each clock work is provided with a dial *18*, which may have as many numbers as there are stations upon the line. This dial operates in conjunction with a toothed wheel, so arranged as to engage or disengage with the pins *14* and *10* upon the lever arm *11* in Fig. 3. To make a call any party rings with the magneto. This sets free the mechcanism of all the instruments on the line and each dial revolves synchronously with all the others. Whenever the pin *10* of any instrument drops into a slot cut opposite the appropriate number upon the dial wheel the lever *11* is free to move and consequently the bell of that particular instrument will ring, whereas the bells of all the other instruments will be locked. This device operates upon the well known method of synchronous electromagnetic gear trains.

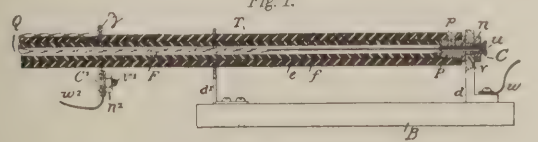




PROTECTIVE FUSE APPARATUS.

Wilton L. Richards, of Malden, Mass., patents (No. 736,019) an improved fuse and assigns his patent to American Telephone and Telegraph Co., New York. The object of this invention is to provide a fuse to be used in the protection of central offices and subscribers substations, which shall be more reliable and shall suffice to protect circuits against higher potential and stronger currents and be safer than those which have formerly been in use. This invention is shown in Fig. 1. It consists of an insulating porcelain base *B* carrying two springs *d* and *d*. These springs serve to support a long fibre tube *T*. This tube is made by inserting a small tube inside of a large tube in order to get sufficient thickness of fibre to withstand the explosive forces developed by the operation of the fuse. In the centre of this tube the fuse wire *Q* is placed and fastened to the terminal *C* at the rear end and turned over and backwards along the fibre tube and fastened at the point *z* some distance from the open end of the tube. The peculiarity of this fuse is that at the end *P* it is made smaller than the end *Q*, so that the fuse will blow first at the rear end of the tube and the arc formed is extinguished by the explosion, which is expected to drive the fuse completely out of the tube.

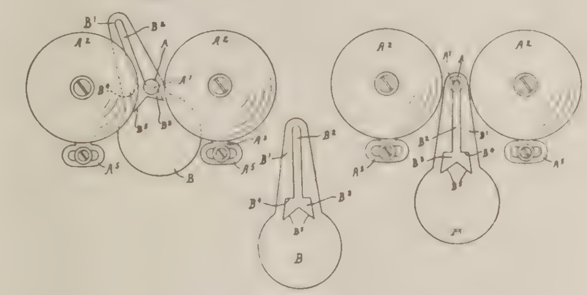
Fig. 1.



INDICATOR ATTACHMENT.

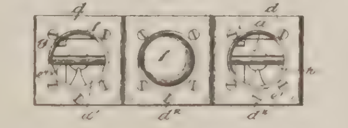
Charles E. Monroe, of New York, patents (No. 736,616) an indicator attachment and assigns his patent to Ericsson Telephone Company. The object of this invention is to provide an inditator which shall show by its position whether the telephone bell of any substation has been rung during the absence of the owner. The device is shown in Figs. 1, 2 and 4. It consists of a light disc of paper, shaped as shown in Fig. 4. This disc is placed over the bell hammer and normally rests upon the pin *A'* Fig. 1. When the hammer vibrates the paper indicator is knocked off the pin *A'* and falls down to the position shown in Fig. 2.

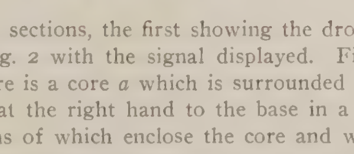
FIG. I

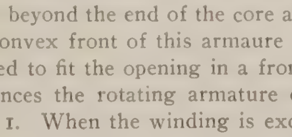


ELECTROMAGNETIC SIGNAL INDICATOR.

William W. Dean, of Chicago, Illinois, patents (No. 735,953) an improved electromagnetic signal-indicator and assigns his patent to the Western Electric Co. The object of this invention is to provide an improved signal or drop which shall be self-restoring, simple in construction and chiefly applicable to telephone switchboards. It is illustrated in Figs. 1, 2 and 4. Figs. 1 and 2 are longitudinal sections, the first showing the drop in its normal position and Fig. 2 with the signal displayed. Fig. 4 is a front elevation. There is a core *a* which is surrounded by a winding *b* and is secured at the right hand to the base in a U shaped pole piece *c*, the arms of which enclose the core and winding. These arms are prolonged beyond the end of the core and hold a rotating armature e^1. The convex front of this armaure is made of aluminum and is arranged to fit the opening in a front plate *d*. Under ordinary circumstances the rotating armature occupies the position shown in Fig. 1. When the winding is excited the armature rotates to the position shown in Fig. 2. The front elevation of these two positions are also shown in Fig. 4. Under these circumstances the aluminum shutter froms a conspicuous signal.







The Week's Messages.

FINANCIAL

BOSTON, MASS.—The American Telephone & Telegraph Company instrument statement for the month ended July 30 and since Dec. 20 compares with the month ended July 20 and the period from Dec. 20 in previous years as follows:

	1903	1902	1901	1900
Gross output	69,194	59,935	56,526	65,463
Returned	44,116	34,054	30,241	30,093
Net output	25,078	25,881	26,285	35,370
Since Dec. 20:				
Gross output	669,258	649,044	526,449	411,609
Returned	279,257	260,321	224,810	162,753
Net output	390,001	388,723	301,639	248,856
Total outstanding	3,540,321	2,914,735	2,254,455	1,829,361

ELYRIA, O.—At a meeting of the stockholders of the Elyria Telephone Company, a resolution was adopted to increase its capital stock from $25,000 to $50,000. They have purchased property and will immediately proceed to install a complete up-to-date telephone exchange with all the modern improvements. The exchange now has nearly a thousand subscribers, and the new exchange will take care of twenty-five hundred.

JOHNSTOWN, O.—The Johnstown and Canton Telephone Company has increased its capital stock from $30,000 to $50,000.

FRANCHISES

GREAT BARRINGTON, MASS.—The selectmen have voted to allow the Southern Berkshire Independent telephone company to locate poles and wires in the town.

HEMPSTEAD, N, Y.—Frank Lowden, of Hempstead, representing the New York and Long Island Telephone Company, asked for favorable action on an application for the general installation of that telephone service in the court house. The petition was granted.

PATCHOGUE, N. Y.—The Suffolk County Telephone Company has made application for permission to erect poles and wires in the streets of the village. The application was signed by H. Clay Losee, Daniel Chichester, Fremont Hammond and Joseph T. Losee, directors.

TROY, N. Y.—The New York and Northern Telephone Company of Troy has made an application for a franchise at Burlington.

CHATTANOOGA, TENN.—The franchise for the Hamilton Telephone Company has been passed in both boards of the city council in two readings and referred to committees favorable to the ordinance.

CHATTANOOGA, TENN.—The Hamilton Telephone and Power Company held a meeting recently at the Bank of Chattanooga and decided to ask the city council for a franchise. The citizens of Chattanooga have expressed approval of the organization of the new company, and are strong in their condemnation of the East Tennessee Telephone Company. It is thought that H. S. Probasco, president of the Bank of Chattanooga, will be elected president of the new company.

CORSICANA, TEX.—The commissioners court has granted French & Griffin the right to construct a telephone line from Navarro Mills to Purdon.

DALLAS, TEX.—It is reported on good authority that J. D. Lloyd and associates, of Wilkesbarre, Pa., will soon make application again for an Independent telephone franchise. W. H. McGrath, Mr. Lloyd's Dallas representative, has been in the East for more than a month.

SEGUIN, TEX.—The city council has granted a franchise to the Commercial Telephone Company to erect a system of poles, wires, etc., and to conduct a telephone business in the city.

COMBINATIONS

VANBUREN, IND.—The VanBuren Telephone Company's plant has been sold to D. E. M. Beekman and E. O. Woods. Beekman formerly owned the plant and has bought it back because R. W. Lowe, principal owner, owned another plant and could not successfully look after both. Consideration, $3,000.

CAMERON, MO.—The Clinton County Mutual Telephone Company promises to combine all the old established systems in this section and become the biggest rural corporation in the state. The farmers have secured franchises in Lathrop, Plattsburg and Cameron. In the first town they secured control of the Home Company. It is now known that the Clinton County Mutual intends to connect with the DeKalb County Mutual and absorb various smaller systems in Daviess and Caldwell counties.

MACON, MO.—Theodore Gary has purchased a controlling interest in the telephone exchange at Atchison, Kan. The exchange has 1,100 telephones now in use. Mr. Gary was elected president of the company. The company will spend $25,000 in the betterment and extension of its service within the next four months.

JAMESTOWN, N. Y.—John H. Wright, superintendent of the Jamestown Home Telephone Company, has disposed of his interest in the Cochranton telephone exchange to his former partner, David Beringer. It is stated to be one of the best built and best paying of the small exchanges in this part of the state.

MILLER, S. D.—MacDougal & Taylor, of Wahpeton, N. D., have bought of Jas. Fitzgerald the telephone system here. The new owners expect to overhaul and enlarge the system, making it first-class in every respect. A rural service will be put in, abundant patronage for such lines being in sight.

GAINESBORO, TENN.—The property of the Overton Telephone Company will be sold at auction on the 20th inst., at Cookeville, to satisfy a mortgage made to the First National Bank of Gainesboro for about $1,700.

PERSONAL

S. W. BALDWIN, chief operator of the Springfield, Mass., telephone exchange, has received notification that he has been promoted to general manager of the Lee & Stockbridge telephone lines.

CLAUDE G. CARPENTER, manager of the Bell Telephone Company plant at Findlay, Ohio, has resigned. In his place is F. Luckengell, former state traveling auditor for the Central Union.

F. D. CARPENTER, manager of the Findlay, Ohio, Bell Telephone Company, is spending his outing at Reeves Park. In a tent furnished with telephone, electric lights and other appliances of the modern home.

H. E. HUGHES, manager of the telephone exchange at Greenfield, Mass., has been transferred to the exchange of the New England Telephone Company in Pittsfield, Mass.

LELAND HUME, general manager of the Cumberland Telephone & Telegraph Company, at Nashville, Tenn., has gone to Atlantic City and New York for a vacation of about two weeks.

MRS. PHOEBE MOULTON, mother of Captain I. H. Moulton, president of the LaCrosse, Wis., Telephone Company, has just celebrated her 103d birthday.

R. S. MENEFEE has been appointed manager of the Southwestern Telephone and Telegraph Company, at Flatonia, Texas.

B. F. NEVIUS, who has been in Bridgeton, N. J., for the American Electric Company, of Chicago, has accepted a position with the Interstate Telephone Company, and will make his home in this city.

G. G. McNEESE, manager of the Southwestern Telephone Company, at Houston, Texas, has gone to Hempstead on business connected with the company at that place. Mr. McNeese has lately been made manager of the exchange at that place.

JOHN F. NEIHART, of 324 Franklin street, Reading, Pa., has been appointed the local agent for the Benbow Company, of Philadelphia.

FRANK PARKER, who has been employed for several years past in the electrical department of the Cumberland Telephone Company, at Nashville, Tenn., has been appointed chief electrician at Evansville, Ind., and will at once take charge.

JOHN CASEY has left the Central District Printing and Telegraph Company of Pittsburg and rejoins the Kinloch Telephone Company of St. Louis, Mo.

THE WEEK'S MESSAGES—Continued

T. E. TAPLEY, manager of the Norwood, Mass., telephone exchange, has gone for a week's vacation in Maine.

E. L. TAYLOR, for a number of years manager of the Home Telephone Company's exchange at Fort Wayne, Ind., has been notified that he has been promoted to the position of division superintendent for Northern Indiana. He will still have his headquarters in Fort Wayne. He will be succeeded as local manager by C. D. Truman, of Indianapolis.

E. L. WORTHAM, formerly associated with F. L. Bills in the promotion of telephone franchises in the tri-cities, was in Rock Island, Ill., recently. He says that Mr. Bills is now installing a system at Lincoln, Neb.

ELECTIONS

GOSHEN, IND.—The stockholders of the Home Telephone Company, at their meeting at Elkhart, Friday night, elected Dr. I. W. Short as a director to fill the vacancy caused by the resignation of George H. Fister.

BERTHA, MINN.—The Hewitt-Wrightstown Telephone Company held its first annual meeting at Wrightstown and re-elected the following officers: President, J. E. Stitzel; vice-president, A. A. Burch; secretary, B. Aldrich; treasurer, E. W. Smith. Seven managers were elected, one for each of the seven branches which center at the head office in Wrightstown.

JAMESTOWN, N. Y.—The first meeting of directors of the Ashville & Panama Telephone and Telegraph Company was held at the law office of Frank H. Mott. The meeting was called for the purpose of organization, and the following officers were elected: President, George W. Appleby, Watts Flats; vice-president, Brewer D. Phillips, Jamestown; secretary and treasurer, Alton H. Appleby, Watts Flats. The corporation entered into an agreement to purchase the Independent telephone lines and business heretofore belonging to the Messrs. Appleby, which included lines through the towns of Busti, Harmony, Chautauqua and Sherman, with extension into Warren county, Pa.

KINGSTON, N. Y.—The Citizens' Standard Telephone Company to-day elected the following directors: Mortimer C. Drake, James H. Everett, Jay E. Klock, of Kingston; Howard Hendrickson, of Albany; I. H. Griswold, S. B. Rawson and T. M. Brush, of Elyria, Ohio. The directors then elected the following officers: President, M. C. Drake; vice-president, Jay E. Klock; secretary and treasurer, Charles Reynolds, Jr.; manager, T. O. Gilchrist. The affairs of the company were reported to be in a flourishing condition, a dividend of one and one-half per cent. having been declared.

WOODSFIELD, O.—At the annual meeting of the stockholders of the Woodsfield Telephone Company, the following were elected directors: F. C. Huth, W. E. Mallory, P. E. Fraley, L. E. Stegner and J. B. Rhodes. The directors elected: President, J. B. Rhodes; vice-president, W. E. Mallory; secretary and treasurer, P. E. Fraley; general manager, F. C. Huth. L. E. Stegner was appointed foreman of construction. The president was authorized to purchase a large amount of material for the purpose of improving and extending toll lines throughout Monroe and adjoining counties. Arrangements for a connection with the United States long distance lines are being made.

UNDERGROUND

MILFORD, DEL.—So many wires are now being used for telephone and electric light purposes in Milford that there is a sentiment apparent in favor of underground wires.

ATLANTIC CITY, N. J.—The Atlantic Coast Telephone Company is preparing to install a new plant in a new building, and all of its wires are to go underground.

OBITUARY

J. McNAUGHTON, manager of the Northwest Telephone Company, at St. Cloud, Minn., was killed by an electric light wire that had crossed with a telephone wire.

RATES

NASHVILLE, TENN.—The Cumberland Telephone Company has announced that night rates will be charged for all business over its long-distance lines on Sundays. This means, of course, that all Sunday messages will be charged for at exactly half the rartes that govern in the day hours on other days of the week. The change is largely in the nature of an experiment, and has been inaugurated in an effort to make social intercourse by wire more convenient and pleasant.

MISCELLANEOUS

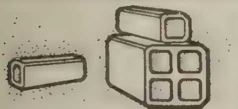
MULLICA HILL, N. J.—Representatives of Gloucester County Grange will meet at the home of State Master G. W. F. Gaunt, near Mullica Hill, to consider the establishment of a local telephone system among the farmers of the county.

ILLIOPOLIS, ILL.—J. P. Shaffer has his telephone exchange in operation. He has over fifty telephones and expects this number greatly increased by winter.

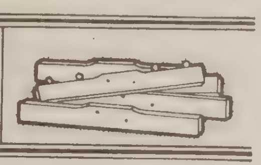
TOLEDO, O.—The Toledo Home Telephone Company has just celebrated the first anniversary of the opening of its service. The company has had an exceedingly prosperous year, and while the exchange was opened up a year ago with less than 2,500 telephones in use, it now has more than 7,300 telephones working, with many orders awaiting increased facilities which will permit the company to take care of them. The company is just completing the work of laying 40,000 feet of cable, which will permit it to take care of its present needs.

COLUMBIA, PA.—The Columbia Telephone Company has purchased from D. B. Case the property in Marietta in which their exchange is located.

WILLIAMSPORT, PA.—The Montoursville Telephone Company, chartered about two months ago, with Reuben Rothfuss, county commissioner, as president; Dr. R. H. Milnor, of Warrensville, secretary; Watson Wilson, Loyalsockville, assistant secretary, and Fulmer Hayes, of Farragut, treasurer, are meeting with unlooked for difficulty in establishing their lines.



New Construction in the Field



HUNTSVILLE, ALA.—The Huntsville & Guntersville Telephone Company has decided to extend the line from Gurley to Giles Store, sixteen miles northwest of this place, through a prosperous section of the country.

WILMINGTON, DEL.—Business men in New Castle will make an effort to have the Delmarvia Telephone Company extend its line to that place and establish an exchange.

COLUMBUS, GA.—The Adams telephone system of Stewart county has been extended to this city, a line being built through Russell county, Alabama, up the Chattahoochee river to Girard.

TEXAS, GA.—Jack Kitchens, of Texas, will build a telephone line from Roanoke to Franklin via Texas and Rock Mills.

EDDYVILLE, IA.—The Eddyville Telephone Company has completed two new party lines west of town, one on Grays Creek, the other to Miller's Creek.

CASTLETON, ILL.—The Castleton Telephone Company is extending its lines toward Toulon. It was recently granted a franchise to build and operate a telephone system there.

FREEPORT, ILL.—The New Telephone Company announces the completion of a line from Freeport to Lena, connecting with the Pearl City Independent lines and various towns on that system. The Pearl City system will be overhauled and put in first-class condidtion as soon as possible. Patrons of the new company will have free service over the Lena and Pearl City line. Several carloads of material have arrived and construction is progressing on a line connecting the new system with Shannon, Lanark, Mt. Carroll, Savanna and various other towns in Carroll, Ogle, Whiteside and adjoining counties in Iowa.

HAMILTON, O.—The managers of the Hamilton Home Telephone Company have made the announcement that they now have a line into Cincinnati and that within the next week or two there will be direct connection between Hamilton and Cincinnati over their lines. O. M. Bake, one of the moving spirits in the management of the Home Telephone Co., has been in Milford, Terrace Park and other places along the Little Miami river where the Independent company has secured rights of way and erected lines. The Home telephone line runs from here to Bethany, thence to Mason, to Milford, and from Milford to Cincinnati.

NOBLESVILLE, IND.—Workmen are setting poles for the new telephone line which Jay Voss and Ross Farley are putting up southwest of the city. Connection with the Home Company's plant will be made at the Strawboard works.

SULLIVAN, IND.—The Carlisle and Merom Telephone Companies have made arrangements for free connections between the two towns. Carlisle will put up the line as far as Rose Chapel, where it will meet the wire from Merom. The Carlisle Company and Rush L. Bond, of Oaktown, owner of the telephone system there, have entered into an agreement whereby all subscribers to the Carlisle system and connecting lines are to have free connection with Oaktown.

PRESTON, IA.—The Jackson Telephone Company, of Preston, is extending its lines to Union Center.

THE WEEK'S MESSAGES—Concluded.

VINCENNES, IND.—The Home Telephone Company of this city has extended its lines to Oaktown, Busseron, Emison and Bruceville. The line to Bruceville connects with the Bruceville telephone exchange, which company has connection with more than seventy-five telephones in Washington and Busseron townships.

TOPEKA, KAN.—Work on the Kansas City-Topeka Independent telephone toll line has been commenced from the Topeka end. The line is being built by the Western Independent Telephone Company. When the Kansas City-Topeka line has been finished, a toll line from Topeka to Wichita will be built by the same company.

TAUNTON, MASS.—The promoters of the new Massachusetts Telephone & Telegraph Company report satisfactory progress in their canvass for subscribers and that their agents have already secured 250 subscribers.

FAIRBAULT, MINN.—A meeting of farmers was held Wednesday evening at the Forest creamery for the purpose of considering the establishment of a rural telephone system.

ST. LOUIS, MO.—Preparations are being made by the Kinloch Telephone Company to establish a branch exchange in East St. Louis. A suite of rooms has been rented and the work of installing the switchboard will begin in a short time.

HAVRE, MONT.—The new telephone from F. H. Scott's place at the head of Clear creek to Chinook will soon be under construction. The contract for setting the poles has been let to Kyle Lowry. The contract for stringing the wire and connecting up the instruments will be awarded later. The officers of the company are: W. B. Sands, president; John Many, secretary; and the directors are Alex Ross, J. C. Griffin, Mr. Ruhe, Frank Parker and W. B. Sands.

HIBBING, MINN.—A complete telephone system has been installed by the Great Northern Railway Company on its line between Superior and all range towns. Telephones have been installed at Brookston, Fox, Ellis, Buhl, Chisholm, Hibbing, Mahoning, Kelly Lake and Virginia. The company's object is to relieve the telegraph wires as much as possible.

AVOCA, N. Y.—For some time past G. T. Conine, of Prattsburg, has been building a telephone line from that place to this village, which is now completed to the corporation limits. It is expected that an office will soon be opened here so that patrons can communicate with Prattsburg, Pulteney, Branchport, Rushville, Penn Yan and many other places reached by the hundred miles of line.

TRADE NOTES

The Connecticut Telephone and Electric Company, of Meriden, Connecticut, has certified the increase of its capital stock from $36,000 to $45,000, and the number of shares from 360 to 450, par value $100 each.

The F. Bissell Company of Toledo, Ohio, has sold 200 of its cable trolleys to the Salt Lake City Telephone Company. There has been quite a demand the country over for the pole seats manufactured by this company, so much of a demand that it has had some trouble to keep apace with orders.

The Vought Berger Company, of La Crosse, Wis., lately had an accident at their manufactory. The city of La Crosse was visited by a severe windstorm which did a great deal of damage throughout the town and neighboring villages. The large smokestack on the Vought Berger factory was blown over and completely demolished, but a crew of men were immediately put to work repairing the damage.

The Swedish-American Telephone Company, of 88-90-92 Jackson Boulevard, Chicago, reports that the Selective Signalling apparatus that they recently put on the market is meeting with universal favor. The simplicity of the device makes it doubly attractive to buyers and those interested in this class of apparatus. The complication of springs, triggers and mysteriously wound coils is done away with, this insuring the user satisfactory service and the operator a low cost of maintenance.

The Kellogg Switchboard and Supply Company, of Chicago, has been awarded the contract for a switchboard and telephones for Linton, Indiana. The Linton contract calls for an 800 line switchboard, with an ultimate capacity of 3,000, and telephones. The directors of the New Home Company, of Linton, compose part of the board of directors of the Knox County Telephone Company, of Vincennes. On account of the satisfactory results from Vincennes, they ordered an exact duplicate of the board for Linton.

The Hydra Battery Company, 72 Reade Street, New York City, has lately equipped many of the signal stations of the United States Signal Service with batteries of its manufacture. One shipment, for equipping the electric signal apparatus, was made to Fort McKinley, which is located on an island off the coast of Maine. It is at this station that the naval manœuvres are to take place in the fall, on which occasion the signal appliances will be used. This company is making a specialty of this Vesuvius cell for telephone work. The cell is manufactured in three different sizes, so that all classes of service can be satisfied. The company uses the very best material obtainable in the manufacture of its batteries. As it finds it impossible to get as good grades of carbon and other requisite materials, in this country as in Europe, all that is used is imported, which insures a first-class uniform product. Circulars describing the batteries will be cheerfully sent to anyone interested.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

TELEPHONE EXCHANGES—Two first-class telephone exchanges for sale. One 180, the other 200 telephones. Also 20 miles of metallic and 30 miles of grounded toll line. All standard construction and in first-class condition. Net income over $4,000 per year. Price, $15,000 cash or good paper. No trades considered. Address UNITED TELEPHONE CO., Malden, Mo.

TELEPHONE PLANT. Best paying telephone plant in Kansas for sale. For full description and particulars address, Box 76, The American Telephone Journal, 116 Nassau St., New York City.

FOR SALE—For $30,000, if taken at once, telephone system of 650 subscribers, paying 30 per cent. and still increasing. Good long distance connection. The company owns toll lines through three county seats and several other towns. If you are in the market and mean business, write us by reurn mail. We must close out in 30 days. Some one will get a snap. Sixty-three miles of line will reach Omaha and Council Bluffs, with good long distance connections through Nebraska. Address Box 944, Corning, Iowa.

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Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

THE LIBRARY OF CONGRESS desires to secure Volumes 1, 2, 3 and 4 of The American Telephone Journal for its file. Parties who may have these volumes, or parts of them, which they would like to dispose of, please communicate with the LIBRARIAN OF CONGRESS, Washington, D. C.

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau street, New York City.

POSITION.—Assistant Manager of New York City exchange (3,500 subscribers). A No. 1 business experience, technical education, desires good opening, Middle West or East. Practical maintenance and construction experience. Age, 30. Address Box 80, The American Telephone Journal, 116 Nassau street, New York City.

The American Telephone Journal

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VOLUME VIII SATURDAY, SEPTEMBER 5, 1903 NUMBER 10

THE "BY-PRODUCTS" OF A TELEPHONE EXCHANGE

By Albert Goldstein.

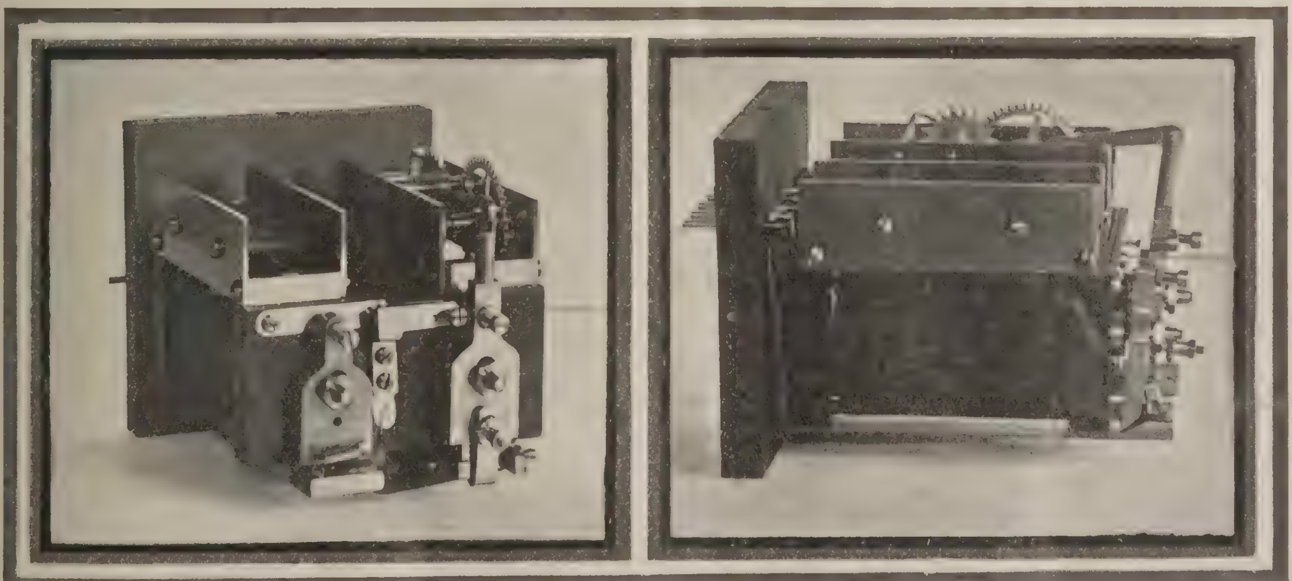
THE announcement in the last issue of The American Telephone Journal, of the contract between the New York Telephone Company and the Police Department of the City of New York, for the installation of a patrol signal system in the Borough of Manhattan, consisting of 661 stations and 33 precinct switchboards, is a matter of far greater significance than any casual reader might think. The $20,835.20 per annum is a big revenue for the comparatively small outlay that is required for the construction and installation of the boxes and switchboards referred to, as the underground circuits consist mainly of "spares," or wires that would otherwise be idle awaiting the demands of the future.

It is only sound business economics for telephone companies to get all the revenue from their plants that they are capable of yielding in the way of "by-products." Moreover, the general public would be greatly accommodated and benefitted by the economy and efficiency to be derived from the application of these facilities, to all other forms of district telegraph service. The facilities upon which they are at present obliged to depend are exceedingly crude in comparison, and are entirely inadequate to modern requirements. The great drawback and limitation incidental to the operation of all forms of district telegraph service, particularly in the larger cities, lies mainly in the lack of proper construction and maintenance of the outside circuits. No one outside of those directly engaged in the business can have any conception of the many problems involved in this regard. In fact, there are but two forms of service for purely local requirements; namely, telephone and electric light and power, whose commercial applications warranting the employment of millions of capital, admit of the placing of the circuits underground. This they do in the most permanent manner, and on the most approved engineering lines. In the case of all common forms of district telegraph service, the commercial limitations of the respective classes of business compel the employment of every possible makeshift and expedient to escape the expense of underground construction.

Even in respect to the leasing of spare underground lines from the local telephone companies, which practice is resorted to in such streets as are restricted from overhead construction, the expense must be confined to the most absolute minimum, as the yearly rental charged for the use of such lines is usually out of all proportion to the commercial limitations of the business. The expense is rendered possible only by the *averaging* of the cost with that of the overhead construction, and therefore, to keep down this average cost, the relative amount of overhead construction must be kept at the utmost possible maximum. Even in the case of the fire alarm telegraph, and police signal telegraph service of the municipalities, the underground service, to such limited extent as it usually exists, is generally crude and inefficient as compared with the plants of the local telephone and electric light and power companies. This is owing to the lack of proper engineering facilities and the inability to secure appropriations for the construction and maintenance of adequate underground service. This at once explains the absence of a police signalling system, for so many years past in a city like New York, where the cost of the underground construction is practically prohibitive. The presence of such a system, during the same interval, in cities as small as Jersey City, Hoboken and Newark, where the same onerous conditions in this respect do not prevail is also thus explained.

So far as automatic and manual fire alarm telegraph, burglar alarm, watch clock and messenger call service is concerned, the necessities of the companies engaged in these classes of district telegraph business are such, that their outside circuit facilities—except such limited portion of their plants as consist of lines leased from the local telephone company, and which must be kept down to an absolute minimum—are of a precarious and untenable character as compared with the permanent and enduring

Two Views of the Neutral Relay for Adapting Telephone Circuits to Other Services.



construction of the telephone and electric light companies. For comparison they might well be classed as squatters, depending upon whether their circuits are stationary or in process of being "moved on" by the city authorities or the owners of the buildings to which the line fixtures are attached.

If this statement seems too much like an exaggeration to warrant entire belief, then to make it more authoritative, the writer must refer to the fact that it represents his experience of more than ten years in operating automatic fire alarm telegraph service under these identical adverse conditions, in cities like Philadelphia, New York, Brooklyn, and Chicago. It was under the stress of the necessities indicated that he has always been led to consider the use of telephone circuits as the only adequate solution of the problem. The writer's efforts in this direction extend as far back as the time when central energy telephone systems were hardly contemplated.

From the view point of the writer, so simple an expedient as a neutral relay, plus the automatic time cut out, connected in every telephone circuit utilized for both telephone and telegraph service, will do the work for automatic fire alarm, manual fire alarm, watch clock signal, automatic burglar alarm and messenger call service. An amplification of the same device to include the facility of communication in both directions, would do the work of municipal fire alarm telegraph and municipal police patrol signalling as well.

In the limited space of this article, which is intended to be reminiscent rather than technical, it would be impracticable to describe the essential details, and moreover, a description may be seen in certain U. S. and British patents. The extreme simplicity of this particular device is obvious from the diagram. This device, of which the two views are shown, was tested by being connected in a regular common battery telephone circuit. It was found that it would not operate on either direct, alternating or pulsating currents (on account of the differential winding), when they were sent through the circuit in the usual manner. When periodically grounded at the substation, on the battery side of the line, in such a way as would be used for fire alarm signalling only, the relay operated satisfactorily. A modification was suggested in the winding, so as to wholly obviate any impedance to telephone transmission which, was subsequently taken care of in the laboratory, where a standard device was designed, based on the same essential elements.

The delay in the serious consideration of the question of the utilization of telephone exchange plants for auxiliary signalling purposes, has been due to the almost Herculean task of changing over from the local battery to the common battery type of exchange, which has been going on for several years past. The immensity of the work has been such that the only illustration that will do it justice is to liken it to the task of all the railroads in the country undertaking, in one successive process, the replacing of all their bridges and roadbed with a new type of construction without disturbing the traffic.

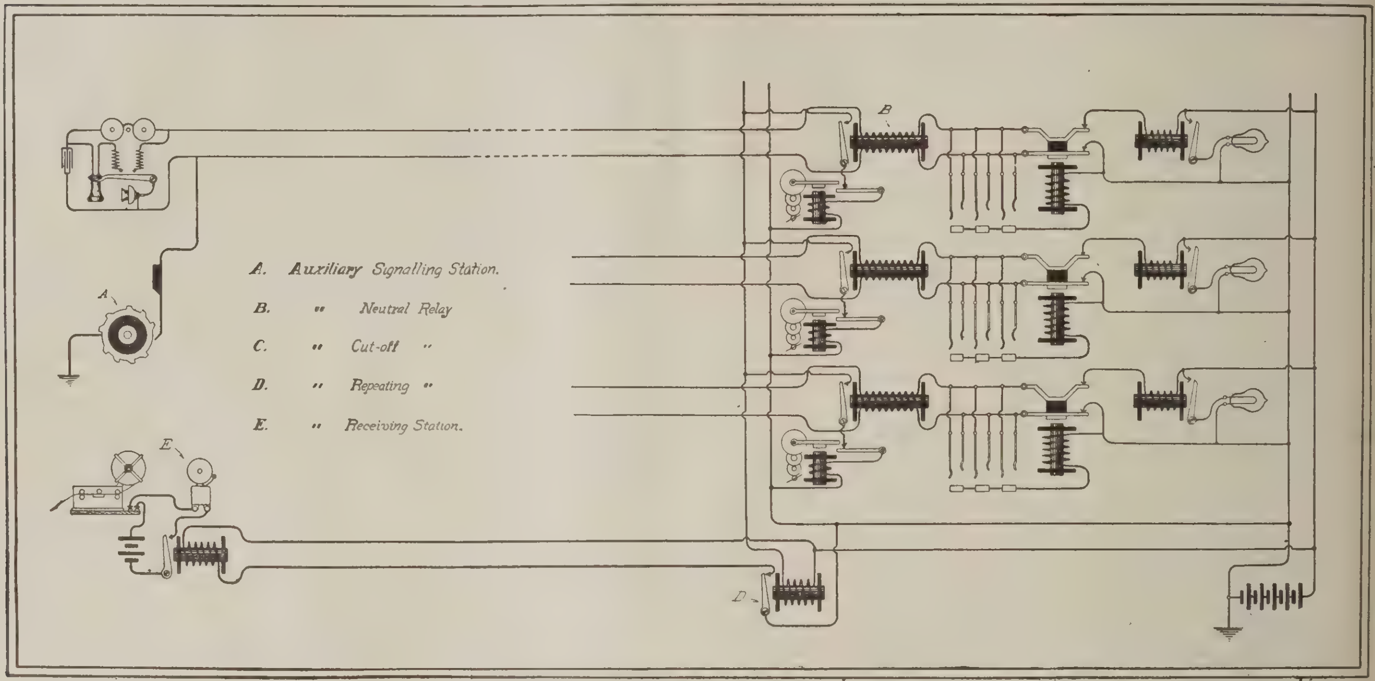


Diagram Showing How the Auxiliary Signal Apparatus is Connected in the Telephone Circuit.

ELECTRICAL MEASUREMENTS—ARTICLE XVIII

EARTH TESTS

By Arthur Vaughan Abbott.

FROM time to time trunk line circuits have been proposed and very successfully operated by means of so-called phantom circuits, in which the ground is used for one conductor and both sides of the line employed for the transmission either of signals or of conversation. For such a case it is desirable to know accurately the resistance of the earth. This is particularly essential in the operation of trunk lines over a phantom circuit, in order that the battery power may be properly proportioned at the different ends of the lines.

The method of measuring the conductivity of three wires may be used to determine the resistance of the earth between two points, provided two wires are at hand for the purpose. Let us designate these two wires, respectively, as No. 1 and No. 2. First loop these wires at the distant end, measure the resistance, calling it R_1. Next ground wire No. 1 and remeasure, obtaining the resistance of the loop, consisting of the earth and wire No. 1, which may be called R_4. Lastly, ground wire No. 2 and again measure, calling the resistance of this last loop R_5. Now $\frac{R_1 + R_4 + R_5}{2}$ is the sum of the resistances of the two wires and the earth. By deducting from this quantity the resistances of the two loop wires the remainder will evidently be that of the earth. It is also apparent that this method may be used to determine the resistance of each of the testing wires by calling the earth the 3rd wire, because if R_4 be deducted from $\frac{R_1 + R_4 + R_5}{2}$ the difference will be the resistance of wire No. 2, and similarly by subtracting R_5, instead of R_4, we can get the resistance of wire No. 1. While this method eliminates the errors due to poor grounds, it does not obviate the difficulties due to earth currents.

Another method of measuring earth resistances, which largely eliminates the question of earth currents, is that shown in Figs. 1 and 2, in which *A* and *B* are the ground plates between which the earth resistance is to be measured. Connect the bridge, battery and line wire, as shown in Fig. 1, unplug the rheostat to bring the galvanometer to zero, and denote this resistance by R. Denote by X the resistance of the earth *A*, and by Y the resistance of *B*, and by L_1 the resistance of the line used for testing, while a and b are the resistance of the arms of the bridge; then from the law of the bridge the following result is obvious: $a R = b (L_1 + X + Y)$. Now change the connections to those shown in Fig. 2, in which the positive pole of the battery is removed from the earth connection *A* and carried to the intersection of the two bridge arms *a* and *b*. While the negative pole, which formerly ran to this terminal, is now connected to a second line, marked *Line 2*, that preferably should run as near right angles to *Line 1* as practical. Again balance the bridge by unplugging the rheostat and denote the resistance thus required by r, then $a (X + r) = b (L_1 + Y)$, that is, $ax + a r = b (L_1 + Y)$, subtract this last equation from the first one, finding $a R - ax - a r = b x$, or $x (a + b) = a (R - r)$ and $x = \frac{a (R - r)}{a + b}$. To obtain the best results, it is advisable to have the battery current, flowing out of the ground plate, in both cases about the same, so it is desirable to insert a milliammeter in this circuit, and adjust the battery cells for this condition. The object of the battery arrangement in the second test is to make the current flow out of the ground plate at *A* in the same direction in both cases.

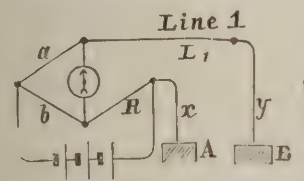


Fig. 1.

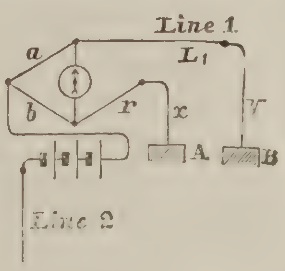


Fig. 2.

An approximate measurement of the ground resistance may be made by means of a low reading volt meter. The instrument should be connected as shown in Fig. 3, in which *Vm* is a low reading volt meter, *R* a known resistance coil, preferably about 10 to 20 times that which the earth is expected to develop, and *K* is an ordinary two point switch. The wire *A* is connected to one earth plate, and the wire *B* connected to the other earth plate, either directly if the plate is near at hand, or by means of a line wire in case it is at a distance.

If a line wire is used it should be one well insulated and in good condition, and one whose resistance is known or can be measured. When the key *K* is open, the reading of the volt meter is the potential difference between the two ground plates. Denote this reading by E. When the key *K* is closed, the reading of the volt meter is the potential difference between the ends of the resistance *R*, denote this reading by e. Then the resistance R of the earth, plus the line wire (which must be deducted) is given by the equation $R = r \frac{(E - e)}{e}$. As the readings of the volt meter can be made almost instantaneously, this is a method to adopt when the earth current is constantly varying, as, for instance, in the case of trolley roads. Example: Suppose the reading of the volt meter, with the key open, is 5 volts. The resistance at R = 3 ohms, and the reading e, with the switch closed, 2 volts, then $R = 3 \frac{(5 - 2)}{2}$ ohms $= R = 4\frac{1}{2}$ ohms.

Another method of measuring earth resistance employs a condenser; the circuit is shown in Fig. 4, in which *G* is a galvanometer, preferably one of the reflecting type, though the D'Arsonval galvanometer that accompanies the ordinary Wheatstone bridge may be used for the purpose. *C* is a condenser, an ordinary telephone sub-station condenser will answer the purpose; *k* and *k'* are two keys, while *r* is a known resistance, say, from 10 to 100 ohms. The leads *A*, *B* extend to the ground plates respectively. The test is made by closing the key *k*. This charges the condenser through the galvanometer, whose deflection should be observed and may be denoted by *d*. The charge thus given to the condenser is that due to the difference of potential between the earth plates, which may be denoted by E. Next, while the key *k* is held closed, the key *k'* is depressed and the earth plates are then shunted through the resistance *r*, and under these circumstances the potential between the earth plates falls to a value which may be denoted by e. This value is given by the equation $e = E\frac{r}{E + r}$ and a new deflection d' will in the opposite direction be observed on the galvanometer. This deflection measures the difference in the electro-motive force E — e. As the deflections are proportional to the electro-motive force, the following relation is true $\frac{E}{E - R} = \frac{d}{d'}$

The two preceding equations may be combined, giving $1 + \frac{r}{E} = \frac{d}{d'}$ whence $E = r \times \frac{d'}{d - d'}$. Example: Suppose the galvanometer to read in the first place, 10 divisions to the right = d, and in the second place, 3 divisions to the left = d', and suppose that r equals 10 ohms, then $R = 10 \times \frac{3}{10 - 3} = 4\ 2/7$ ohms.

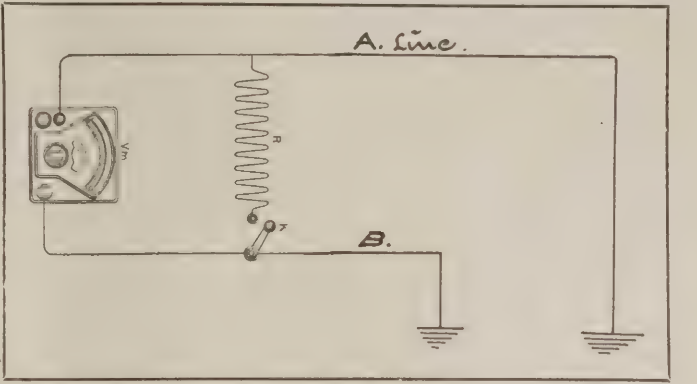


Fig. 3.

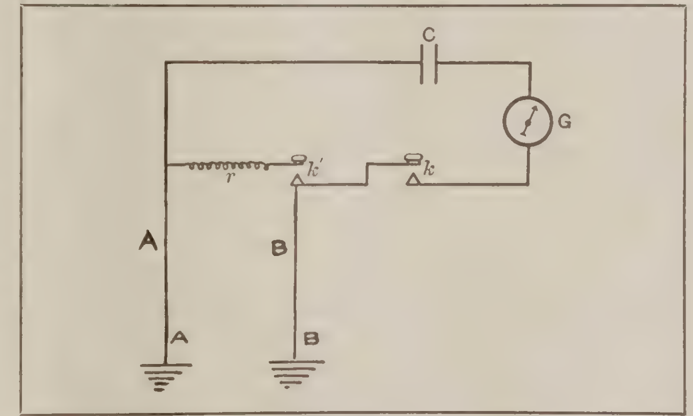


Fig. 4.

THE TELEPHONE WEATHER FORECAST SERVICE

By Geo. M. Chappel, *Local Forecaster, Des Moines, Iowa.*

ALL Weather Bureau officials, like other wide-awake business men, take advantage of every opportunity to increase their business and to serve their patrons in the best way possible, but the Weather Bureau official works solely for the benefit of the people and not for financial gain. Ever since the U. S. Weather Service was established, it has been the aim of all officials to give as wide a distribution as possible to the information they possess, and many schemes have been inaugurated to accomplish this end. In the early days of the service, when it was under the army regime, "Farmers' Bulletins" were published at certain stations throughout the country and distributed by mail to postmasters and railroad agents that could be reached at an early hour in the morning. These bulletins contained a synopsis of the weather conditions over the whole of the country as shown by the reports of the night observations, and also the forecasts, or, as they were then called, "Probabilities," and later, "Indications" for the coming 24 or 36 hours. Upon their receipt by the railroad agents and postmaster, the bulletins were posted in conspicuous places in their respective offices for the benefit of the public. At a later date, the bulletins were superseded by the daily weather map, with which all intelligent people are familiar. We have found nothing to take the place of the weather map, but as it cannot be issued from any but regular Weather Bureau stations its use is limited to the city from which it is issued, and to a few nearby towns, high schools and colleges.

In order that the people in the rural districts and distant towns might have the benefit of the forecasts, forecast display stations were established which were furnished with a set of weather signal flags, and to which the forecasts were telegraphed at Government expense each morning, from some central Weather Bureau Station. Upon the receipt of the forecast by the displayman, the proper flags would be hoisted on a high staff to indicate the probable weather for the next 36 hours, so that every one in the town and surrounding country could see at a glance what kind of weather was expected. This feature of the service was expanded by furnishing certain displaymen, located at points having good mail facilities, with a logotype outfit and a supply of franked postal cards, addressed to the postmasters and business houses in all towns that could be reached within three or four hours.

The displayman would stamp the forecasts on the cards and dispatch them on the first departing mail train. There are about 1,000 towns in this State supplied with the daily weather forecasts in this manner, and the people appreciate the service very highly. The next step in increasing the dissemination of the forecasts was made when the Rural Free Delivery Mail Service was established. The forecasts were telegraphed to the postmasters at points having the rural service, and they were furnished with a logotype outfit and a supply of franked cards on which a copy of the forecasts were stamped, and these given to the rural carriers to deposit one in each mail box along their respective routes. This enabled us to place the forecasts at the doors of over 10,000 farmers in this State.

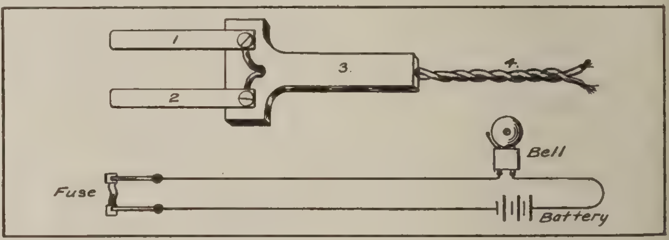
With the inauguration of the rural telephone lines, we were permitted to take another step and place the forecast on the inside of the door of the farmers' houses, and we are now supplying about 22,000 farmers with the forecasts each day before dinner. The service is being extended rapidly, and the demand from telephone companies and farmers is far in advance of our ability to supply the forecasts. We have, at this office, the addresses of 643 telephone companies in Iowa, and we are reliably informed that there are between 500 and 600 more that have been recently organized, and a very large majority of the whole are rural or independent lines, over which the farmers are to be reached. The Weather Bureau delivers the forecasts each morning by telegraph from Chicago to towns from which one or more rural telephone lines radiate. The telegram or a copy of the forecast being given to the chief operator at the telephone exchange, a general call is given to all telephones on all the lines at a preconcerted hour and then the forecasts are repeated to all subscribers at the same time.

The farmers are thus kept advised as to the probability of showers, thunderstorms, frosts, cold waves or snow storms, and arrange their work accordingly, and we are informed that very large quantities of hay and grain have been saved in this State during the past few weeks by the timely warning of approaching showers given by the forecasts. The distribution of the forecasts by telephone, rural free delivery and mail service is being carried on in nearly if not all the States in the Union, and all telephone companies can obtain further information by addressing a communication to the Section Director, U. S. Weather Bureau, of their respective States, or to the nearest Weather Bureau Station.

A SIMPLE FUSE TESTING DEVICE.

By H. G. Addie.

IT is a noticeable thing, that in the exchanges of many telephone companies, no provision is made for conveniently and quickly testing the fuses after a storm or a cross with an electric light circuit. In some cases a magneto bell is used for the purpose, but, obviously, this is a crude, nerve rasping method. The little appliance, here illustrated, has been used successfully for several years for this purpose and we trust that the suggestion may be valuable to some exchange men who have never seen it. Referring to the drawing: *1* and *2* are strips of German silver or other suitable metal, *3* is a handle made of fibre, *4* is a duplex lamp cord. The lower drawing shows how the device is used. To test a fuse the two fingers are placed across its terminals, and if the bell rings the fuse is O. K.; if the bell does not ring the fuse is open. Obviously, the fuses do not have to be taken from the frame while being tested, so by its use the inspector can easily test several hundred fuses in a few minutes. The handle may, of course, be modified to fit any make of fuse. In the company, where the device here described is in use, there is a portable set that contains several handles shaped to correspond with fuses of different manufacture.



TELEPHONES IN GERMANY AND FRANCE.

A STATISTICAL year book for the German Empire for the year 1900 has been issued and in it is given the following telephonic information: In Germany there were 2,411 cities and towns having municipal telephone systems, the total number of connections being 305,795. France had 1,199 public telephone plants, with a total of 72,480 connections.

ABOUT FREE GROCERY TELEPHONES IN TOPEKA

By J. H. Green, *Special Correspondent.*

THE idea of giving free telephones to such of its customers as buy merchandise to the amount of $25 per month, in use by the J. A. Davis Grocery Company, is being watched with interest by the telephone companies, and by the firm's competitors in the retail grocery and meat business at Topeka, Kansas. A little over a month ago Mr. Davis announced that he would install, in the homes of his customers, free telephones on the provision that the amount of merchandise bought by them should exceed $25 per month. If a customer who did not have so large a monthly account with the company wished a telephone, the Davis Company would allow a discount of 5 per cent. of the bill to be applied on the rental of the telephone. For example, if a customer had a $20 bill for the month, the Davis Company would allow 5 per cent. of this, or $1.00, on the rental of the telephone, and the customer would then be at an expense of but 50 cents for the use of the instrument for a month. Other bills with the company were proportionately discounted.

At the outset the plan seemed an excellent one, and despite the numerous details that have developed and the contentions that have risen, Mr. Davis is thoroughly impressed, he says, with the good qualities in such an arrangement and is working to perfect the plan. The first and greatest difficulty with which the grocery company has had to contend is that it is the go-between, getting complaints for tardy or imperfect installation from its customers, and, on the other hand, it has to contend with a company that is overworked. Because of the late Topeka floods and the general conditions there has been a great demand on the telephone company for the installation of instruments. Mr. Davis has to date installed nearly a hundred telephones, but they have cost him much annoyance and a number of customers. One lady thought that she was being discriminated against because a neighbor had her telephone put in first, so she stopped buying goods from the company. Another family had the telephone installed in the residence a short time before the property was sold, and when it became necessary to move, because the telephone could not be changed immediately, there was bad feeling and the customer was lost. Another telephone got out of order during a thunderstorm and the customer is constantly complaining to the Davis Company, which in turn is urging the telephone company to do the repairing, but as the telephone company is somewhat behind in its work, it is impossible to make the repairs immediately.

In order to overcome some of the difficulties and annoyances with which it has to contend, the Davis Company decided that the best way for them to serve their customers was to put the scheme on a somewhat different basis, or rather to give it an apparent different aspect. In view of this, the mercantile company will make a regular discount on the grocery bills monthly and allow the customer to pay for the telephone as if the Davis Company has nothing to do with the matter. Then the telephone company will deal directly with its customers. This is the same thing so far as the cost of the telephone is concerned, for there is no reduction made in the rental of the instruments, whether the company orders one or a hundred telephones.

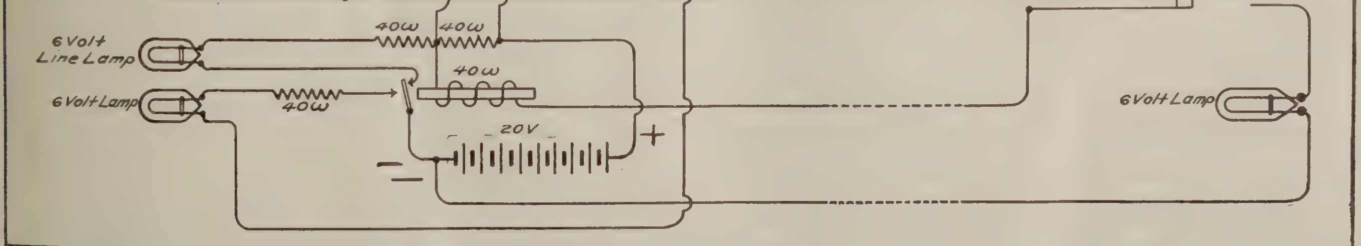
"I am going to keep on," said Mr. Davis, "until I have the scheme perfected, for I am thoroughly convinced that in the long run it will be a money maker as well as a money saver. With the telephones properly installed and operated, I can do away with certain of my order men. Then, also, the telephone is always in the home of my customer, and when he feels like it he can order goods, if it be a dozen times a day. If he forgets anything at the first order, he can call us, and the order will be sent in less time than if the order man was to come in and turn over his orders to us. The idea of the service is its handiness and, when the scheme is perfected, I am very sure that we will not lose money by it. We started the innovation nearly two months ago, and have not put in more telephones because the company here has had so much with which to contend, repairing flood damages, that it could not attend to our needs."

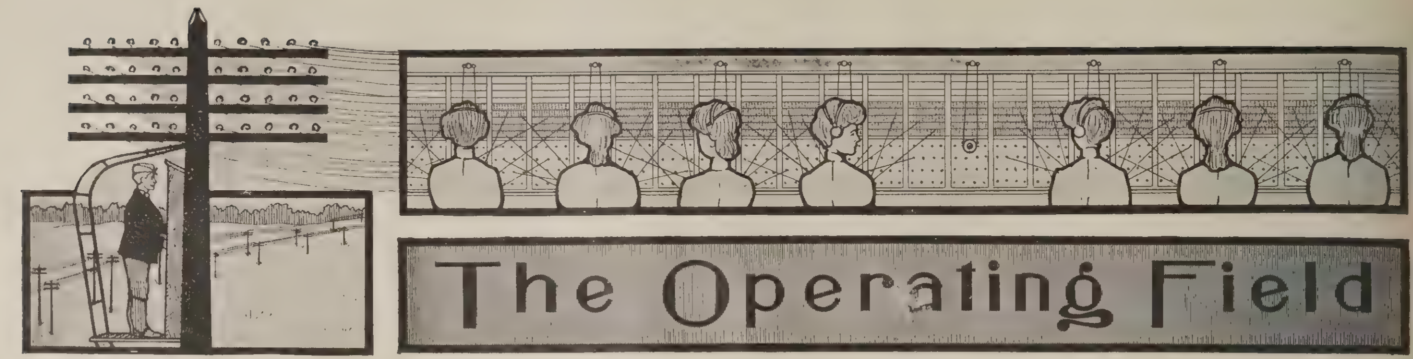
A CHIEF OPERATOR'S AND TOLL BOARD CIRCUIT

By H. D. McVay.

THE diagram shows a Chief Operator's and Toll Board circuit designed by the writer. Its operation is as follows: When plug is inserted on main board current flows from the positive side of the battery through spring *2* of jack to spring contact *4*, through relay and supervisory lamp at main board to the negative side of the battery. This flow of current through the relay causes its armature to draw up and close a circuit through the line lamp on the toll board. By inserting a plug in the jack on the toll board the contact between springs *2* and *4* is broken. All current now flowing will be through the 60 ohm coil. Not enough current will flow to light the supervisory or line lamp, but the armature will be held. When the plug is withdrawn on the main board, the supervisory lamp on the toll board is illuminated, in the following manner: Current flows from the positive side of the battery to contact *2*, and as the plug is inserted, contact *2* is forced into connection with spring *1*. Current now flows from contact *1* to the supervisory lamp on the toll board through the resistance to the back contact of the relay and through its armature, which is connected to the negative side of the battery.

A Chief Operator's and Toll Board Circuit.





The Operating Field

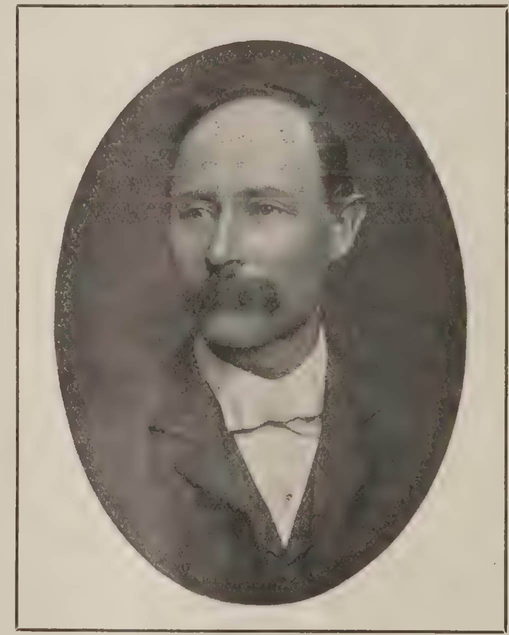
H. C. RANEY DEAD.

WEDNESDAY afternoon, Aug. 19, H. C. Raney, after a lingering illness of some months, passed away at his home in Fairfield, Iowa. An immense throng of friends attended the funeral, which was held in Fairfield, where Mr. Raney has lived for many years. The funeral procession was nearly a mile in length.

Mr. Raney was born in Jefferson county, Iowa, December 11, 1855, on his father's farm near Birmingham. He was raised in Cedar township and when about 16 years of age he attended the academy at Birmingham, which was then considered a first-class educational institution. In 1877 he entered Parsons college and graduated with the first class in 1880. He taught school a short time after this and then read law with Leggett & McKemey, and was admitted to the bar in 1882. He married February 8, 1883, to Mary M. Bogle, who survives him. A number of children were born to them, three of whom are still living. In 1891 he formed a partnership with E. F. Simmons, which was maintained until he died.

In all the spheres of his labors—at the bar, in the church, in telephone and other business fields—Mr. Raney will be greatly missed. It has been said, and truly, that the deceased did whatever he undertook to do, and did it with all the energy and ability at his command.

Mr. Raney was the first president of the Interstate Telephone Association, and while he officered it through the first and hardest year of its existence he made many firm friends among telephone men, both operators and manufacturers. He was one of the hardest workers in the field, for the cause of Independent telephony, and without a doubt, much of the success that has come to the Interstate Association has been due to his efforts during its initial year. All will feel the loss.



H. C. Raney.

SOUTH DAKOTA ASSOCIATION ORGANIZED.

A NUMBER of telephone owners from the towns of southeastern South Dakota met in Parker, S. D., recently and organized the South Dakota Telephone Association, with officers as follows: President, C. C. King, Scotland; vice-president, W. E. Ege, Centerville; secretary and treasurer, H. P. Hartwell, Irene. J. A. Steninger, Parker; F. B. Elce, Mitchell, and Mr. Thompson, of Canton, were elected as members of the executive committee. A committee on by-laws was appointed, subject to meeting at the call of the president. The association was organized for the purpose of mutual benefit, and for the study of improvements for the individual systems. Representatives were present from Mitchell, Scotland, Irene, Centerville, Lennox, Canton, Davis, and Volin.

ONE WAY OF FIXING A TELEPHONE.

THE following story is told of an Iowa telephone man. We cannot vouch for its truthfulness, but will give it for what it is worth. The individual in question was, by the way, new in the field, for his experience to the date of the present happening had consisted of putting some sal ammoniac and water into a battery jar, screwing a telephone to the wall and connecting two wires to its binding posts.

The story goes that a week ago he found his telephone would not work and at once set about to see what the trouble was and fix it himself, if possible. He took the transmitter apart and, as usual in such cases, did not know it was loaded. When he removed the carbon diaphragm, the granular carbon spilled out over the floor, and he could not get enough of it together again to fill the cup; so he took, what he considered, an equally good or better medium, gun powder, and refilled it. Then, following the logical course of reasoning, that had taken him thus far, he concluded that the batteries were weak and that more were needed, so he connected several in the circuit which he had on hand. When he took down the receiver to give the instrument another trial, a spark caused by the extra battery exploded the gun powder, and the telephone man (?) got a charge of carbon diaphragm in the face. An Iowa editor, commenting on the occurrence, suggests that all telephonists of the type just described, first try their granular carbon in a shotgun before trying it in the transmitter, which advice, in view of what has happened, is obviously good to follow. This, it seems to us, shows that it would be well for telephone men, in addition to their other acquirements, to have an elementary knowledge of chemistry.

NEW EQUIPMENT FOR ATCHISON, KANSAS.

THE Atchison, Kansas, Telephone Company has effected a reorganization. At a meeting of stockholders held recently, at which practically all the stock was represented, Theodore Gary, of Macon, Mo., was elected president; E. H. Berry, secretary, and the First National Bank, treasurer. The capital stock was increased from $40,000 to $75,000.

The plant will be entirely rebuilt, and the company will construct its own exchange building. Three sites are now under consieration. One will be selected within a week. A new switchboard will be installed, and 25,000 feet of cable will be put in. It is expected the improvements will be completed by January 1.

All the former stockholders are in the reorganization, besides some Missouri gentlemen, who assist in financing Mr. Gary's enterprises. Mr. Gary is president and manager of the Macon Telephone Company, the Nevada Telephone Company, and the Home Telephone Company, which owns and operates exchanges at Carthage, Webb City, Carterville, and Joplin. Mr. Gary will assume active charge of the management of the Atchison company, but will continue to live at Macon. Ed. Berry will remain with the company as superintendent. Mr. Gary is a successful telephone man, and a dividend earner. It is understood that the Atchison company has authorized an issue of $25,000 in 6 per cent. bonds.

OPENING OF BOWLING GREEN EXCHANGE.

THE opening of the Bowling Green Home Telephone Company's new exchange, at Bowling Green, Ky., was conceded by all to be a pronounced success. The handsome new building was thrown open to all and was decorated with jars of cut flowers and garlands of green tissue paper that hung from the chandeliers and ceilings. A colored string band was in attendance, and selections were rendered throughout the afternoon. In the center of the reception room was a table on which was a case of silver to be presented to the person who best estimated the number of calls handled during the day from 7 a. m. to 6 p. m. The silver consisted of a set of knives, forks, spoons, and tea-spoons. A jardiniere of pink roses and pink carnations occupied one entire table and were given away as souvenirs to guests.

In a cozy corner was a table on which were two cut glass bowls of punch. Young ladies served all visitors. Gentlemen were in attendance to conduct guests through and explain to them the details of the exchange. In the second story is a handsome drawing room, beautifully furnished, which is used as a retiring room for the operators. Crowds began to flock to the exchange at noon and kept the hosts busy all the afternoon. Japanese lanterns lined and illuminated each side of the street for a block around the building.

GOOD YEAR FOR YORK, PA., COMPANY.

THE York Telephone Company, of York, Pa., is yet undecided when it will move as contemplated from its present quarters to the property on East Market Street. Improvements are necessary before the changes can be made. The past year has been a good one, and the growth of the organization quite satisfactory. There are on the directory over 2,200 names, 500 of which have been added in the past six months.

Over 23 miles of new pole line has been built in the county during the past year. This includes Bermudian, Latimore, Big Dam, New Holland, Star View, and Wild Cat Falls. Additional lines are in course of construction from Dillsburg to Latimer and York Springs, and a 14-mile circuit is being established in the lower end of the county.

The present toll lines connect with Baltimore, Philadelphia, Wilmington, Camden, Allentown, Easton, Reading, Williamsport, Harrisburg, and dozens of cities and towns in eastern Pennsylvania, extending as far west as Altoona. The company recently installed 30,000 feet of new cable.

TELEPHONE WIRES CUT.

LINE men of the Nebraska Telephone Company last week cut the wires connecting the Farmers' Telephone Company at a point near Hooper, Neb. The trouble grew out of an agreement made last year with the Hooper Telephone Company and the Nebraska Telephone Company. The contract recently expired, and some of the stockholders of the Farmers' Company were in favor of renewing it. The Nebraska Company has a separate agreement with the Farmers' Company and cut the wires in order to sever all connection with the Hooper Company and the Farmers' Company. A good deal of litigation has already been had between these companies and more will follow.

FRISCO RAILROAD ESTABLISHES SIMULTANEOUS.

A COMPOSITE telephone system is being inaugurated between Springfield and Kansas City by the Frisco system, with an intermediate office at Fort Scott, Kansas. This system is operated over telegraph wires without interference from the telegraph currents. The Frisco already has a telephone system in operation between Cape Girardeau and West Plains, which is giving satisfaction. This is the first installation of that system of communication established west of the Mississippi. It is for the exclusive use of officials in the train service of the road.

A BELL TELEPHONE COMPANY SUED FOR TAXES.

COUNTY ATTORNEY C. W. ROBISON, of Butte, Montana, has filed a complaint against the Rocky Mountain Bell Telephone Company, alleging that the corporation had not paid its taxes since the time it entered the local field. The total amount involved in the suit is $309.55. Of this sum $267.75 is the amount of the license due; $26.77 is a ten per cent. penalty, and $15 is asked for damages. The company alleges that many of its instruments in this city are used in interstate service and are exempt from paying the license demanded by this county.

TELEPHONE LINEMAN LOSES HIS ARM.

ALFRED NUNN, of Memphis, Tenn., is suing the Cumberland Telephone & Telegraph Company for $5,000 damages for the loss of an arm. He alleges that he was employed in building a line from Memphis to Millington and was injured by a tree falling upon him. He was holding a rope attached to the tree at the time and alleges the shortness of the rope and the position to which the foreman assigned him as the negligence that entitles him to recover.

SHE MADE A MISCONNECTION.

THERE came a ring at the telephone in a farmhouse in Northern Indiana one day last summer, and the farmer himself responded.

"Hello!" he said.

"Hello!" said the voice at the other end of the wire. "Can you furnish me a bass singer for to-morrow night?"

"A bass singer? Why, yes, I reckon so," answered the farmer, laughing. "What do you want one for?"

"Because the one we've had up to now is sick. What would be your terms?"

"Well, I usually furnish them by the dozen. I won't charge you anything for one. How do you want him sent?"

"What are you talking about?"

"Who do you think you're talking to?"

"Isn't this the Indianapolis opera house?"

"No. This is the Barataria frog farm."

SHE FIRED THREE SHOTS AT TELEPHONE.

A MUNCIE, IND., young woman had a quarrel with her sweetheart, and when they parted the young man was told never to call again. Two or three days later he called her by telephone and attempted to make up, but she grew so angry at his attempt that in her rage she picked up a revolver and fired three shots at the telephone. There were no arrests, so it is a safe inference that the young man was not hurt—except, possibly, his feelings. The young woman paid willingly for repairs to the telephone.

BRADFORD COMPANY GETS TOLL CONNECTIONS.

THE toll line contracts recently made with neighboring companies by the Bradford County Telephone Company, of Towanda, Pa., gives all its subscribers direct connections with Athens, Sayre, Waverly, Elmira, Breesport, Erin, Van-Etten, Spencer, Corning, Addison, Canisteo, Hornellsville, Wellsville, Olean, Gibson's Landing, on Lake Keuka, Lawrenceville, Pa., and all intermediate points. Binghamton will, in a few weeks, be reached over the Independent lines, as will also Wyalusing, Laceyville, Pittston, Wilkesbarre, Scranton, and hundreds of Pennsylvania points as far south as Philadelphia.

The Editor's Page.

WHY THE BIG SYSTEM COSTS THE MOST.

ALL, who have tried, understand how hard it is to convince the uninitiated that it is more expensive to telephone a large place than a smaller one. It may be that the arguments herein set forth will be of value to such. There are almost obvious reasons why telephone service costs more to produce in a larger place than in a small one, which the telephone man well knows and which some of his critics are willing to admit, such as higher rents or cost of real estate, higher wages and greater cost of living generally, but in the popular mind all these are offset by the fact that a much larger number of telephones are put out, and this, according to general trade theories, ought to enable the greated expense to be borne with profit. The real reason why the telephone service costs so much more to produce in a large city than in a small town, apart from the higher cost of rents, labor and so forth, is the great difference in the distance element. The average distance over which a message is sent is much greater in a large city than in a town. While it might be difficult to give a layman a clear idea of all the numerous effects that a very large area has on the telephone problem as compared with a very small area, it is comparatively easy to demonstrate broadly that there it a great difference, and most people know that in engineering matters even apparently moderate differences in a given line of work produce results and require efforts altogether disproportionate to the apparent change. We will not at present consider the multiple as a factor, although it is an important one.

For example, to bridge a river a thousand feet wide requires a bridge much more than twice as complicated and as costly as one to cross a river only five hundred feet wide. To build a bridge to carry railway traffic is much more costly than to build a bridge to carry ordinary wheel and foot passenger traffic. A ship of a given capacity is much more than twice as costly if designed to steam twenty nautical miles an hour than if built to travel only ten. Instances might be multiplied of problems in engineering where the cost of attaining an increased result is altogether out of proportion to the difference in the result. The speed of a steamship is perhaps one of the best examples, because, in a way, it is a service that is performed, not a tangible product that is turned out, and the problems connected with rendering a service differ widely from those of manufacturing. In these days of popular magazine articles most people know that to add a knot of speed to a sixteen-knot boat means much more than simply increasing the power of the engines by one-sixteenth.

It is clear that in a place having a single central office, the largest amount of plant that a telephone message can occupy will be the sum of the two longest lines connected to an exchange, and the average amount of plant occupied by the average message will be twice the average length of all the lines connected to the exchange. In these exchanges it is the general practice to take care of the cost of the long lines required by outlying subscribers by means of mileage charges on lines of over a certain length or extending beyond a certain radius, generally a mile from the exchange. This is universal practice, and shows that the distance element in local telephone service has always been recognized by telephone managers and has been acquiesced in by the public when badly and bluntly demonstrated by the necessity of building a special line for two or three miles to connect up a distant subscriber. As a general rule, the average length of the subscriber's line in a small single-exchange system is about half a mile, rarely more than two-thirds and seldom reaching three-quarters, so that the average amount of line plant occupied by the local message in such a system, estimating conservatively, is from one mile to a mile and a half.

SOME COMMON PLACE ILLUSTRATIONS.

Now, change the scene from the small town to a city, and to make the contrast the more impressive let us consider a big one. The area covered by our small single-exchange system with an average length of line of about two-thirds of a mile is not much over one square mile, at most not more than two. The area served by a telephone system might cover something like six and seven hundred square miles, and have an extreme diameter of some thirty miles. (There is a city that has a telephone system with these dimensions.) That is to say, that for a certain rate our subscriber can talk anywhere over an area of nearly seven hundred square miles, and may call at any time for connection with a station thirty miles distant from his own. In case of the small town the subscriber talks an average distance of two or three miles (for which somebody has to pay an extra rate); in our example, he talks an average distance of several miles, and can take a maximum distance of over thirty miles.

WIRELESS TELEPHONY, ITS PRESENT STATUS.

WIRELESS telephony, the dream of the nineteenth century experimenter; the hope of the telepathist; a seven by nine pocket affair; a "You press the button, we talk to everybody" thingabob about which, it is said, one can converse with a glibness and an assurance that makes one audibly exclaim, "how simple," and inaudibly chide one's self for not having thought of it all before. But, after all, there seems to be quite a considerable stick, that may hit some one's head unless "they stand from under." Mr. Marconi is quoted as having signaled across the Atlantic; probably he has. It is equally veraciously stated that his transmitting station requires some hundreds of thousands of horse-power, and that the crash of the spark that sets the ether vibrating is so deafening that employees must wear cotton in their ears for self-protection.

Now, looking at it from a cold, calm, practical standpoint, what is there in it? In the first place, telephony must be secret if it is anything. What an ado everyone makes in case the operator cuts into the line for a second. As yet, wireless telegraphy, to say nothing of wireless telephony, has not achieved the secret of selective signaling. Witness the recent uproar in London in the case of Professor Fleming's lecture. A gallery crank started an oscillator and set the learned professor's apparatus chattering after the fashion of the magic drum which stage magicians used to show to their audiences. So it is pretty safe to say that until some method of ethereal signaling shall be discovered, which is absolutely selective for many instruments at a single location, wireless telephony will not be a menace to telephonic investments.

We are not pessimistic, but, on the contrary, firm believers in the probability that the telephonic methods of the next century will be far different and far superior to anything that is now known, and we would be the first to welcome any change which will improve either the quality of the service or decrease costs of installation. But, of all possibilities, the pocket thunder arrangement seems to us to be the most remote, and we feel quite reasonably sure that for many years to come, the gentle feminine operator will guide our messages to the ears of desired correspondents.

Foreign Currents

By "The Arrester."

THE two newest telephone enterprises in Great Britain, that of the Post Office in the first city of the Empire and that of the Glasgow Corporation in the second, have just presented their year's accounts to a more or less indifferent public. These two telephonic ventures have a good deal of interest for those of the profession, alike for the features they have in common and for those which they have not. To begin with, they are both run with the public money, the London system with that of the taxpayer in general, the Glasgow system with money borrowed on the security of the Glasgow ratepayers. They are both run in competition with the previously existing systems of the National Telephone Company, but with a difference. In London the Post Office came to an agreement with the company to charge the same rates and to establish intercommunication between the two systems, the competition to be one of "efficiency" only. In Glasgow, on the other hand, the municipality started in with the avowed object of wiping the National Telephone Company off that part of the map of Scotland over which the Glasgow corporation holds sway. Rates were cut in two, the very thought of intercommunication meant contamination and as for efficiency that of the corporation was to be of a grade that the N. T. C. had never dreamed of in its sweetest slumbers.

Points of Difference

INCIDENTALLY it appears, from various remarks that have fallen from its officials, that the National Company is still doing business both in London and in Glasgow, but nevertheless the two new enterprises have grown apace. The further points of resemblance between the Post Office London system and the Glasgow municipal system are that they both started about the same time and each has about the same number of subscribers. That being said, the points of difference begin to come in. These are many. The Glasgow system was begun with the idea of showing that a city telephone plant could be built for under $100 a line, and to give unlimited service for $25 a year. The system of working adopted was what was known in this country, where it has been extinct many years, as the Law system. The subscriber taps on to a common callwire to give orders for connection and disconnection. This allows of a cheap central office and line plant, but the method of operating is trying for the subscribers. About twenty years ago it was considered an up-to-date method of telephone working. While Glasgow has gone in for last century methods the post office in London is quite abreast of the art. The system is a central energy one and the line plant is underground throughout, with direct underground distribution to the subscribers' premises. Not being hampered either by a low estimate or by a low rate the post office built modern exchanges and planned its line plant for a large future development, having laid conduits and cables for some 30,000 stations.

Financial Results

AS a result of these differences, and some others in local conditions, the financial figures of the two systems are very different. The full accounts for Glasgow have not been published yet, but as nearly as can be gathered from the summary that has and from the previous statement, the total capital expenditure up to May 31 last, the end of the financial year, was $1,350,000 for some 9,000 stations, an average of $150 a station. The capital expenditure on the London system up to March 31, the end of the Postmaster General's financial year, was, in round figures, $5,560,000 for 9,122 stations, an average of nearly $610 a station. This is a striking difference, but it is principally accounted for by the large amount of the London plant not yet brought into use. The London plant will always stand at a higher average cost than the Glasgow plant both because it is of a superior character and because London is a bigger and more expensive place to telephone than Glasgow; but at present not much more than a third of the plant constructed has been brought into use. The Postmaster General is good enough to give some details on this point. He has put down in London altogether 971 miles of duct and 102,000 miles of wire. Of this 16,700 miles have been used for telegraph purposes, 21,800 are in use for the telephone system and 63,500 miles are spare. The average cost per mile of wire has been $45.40.

Revenue and Expenses

WHEN we come to the revenue and expenses a comparison is very difficult, as the Glasgow statement is for a full year's working and the London statement for thirteen months, the London system having begun operations in March, 1902, while that of Glasgow started some time in 1901. The gross revenue at Glasgow was $175,070 and that of London $147,215. The operating expenses at Glasgow were $79,835, those at London $116,390, or almost 60 per cent. more. This leaves Glasgow with a net revenue of $95,235, of which interest, sinking fund, royalties and terminal fees absorb $86,760, leaving, with the surplus from the previous year, which amounted to $1990, a net surplus of $10,465 to be carried to reserve fund. The London net revenue of $30,825 does not go very far toward meeting interest, sinking fund, depreciation, etc., on a capital of over five and a half millions. The amount required by the Postmaster General for depreciation alone is over $120,000, while interest at 3 per cent. demands another $166,800, to say nothing of sinking fund. Apparently, therefore, it will be a long time before the London system will make both ends meet, as a loss of over $250,000 a year will take a lot of catching up. It will be noted that the post office takes note of depreciation whereas Glasgow knows it not. True, ten thousand dollars would not go very far in depreciation on a plant costing thirteen hundred thousand.

Rapid London Progress

THE general information given on the London system is quite interesting. The Postmaster General speaks with pardonable pride of its rapid progress and of the great amount of work done in providing for future development. The main exchange was opened March 1, 1902, and six other exchanges have been opened during the year, while four more are in an advanced stage of construction. During the year 8,628 subscribers' telephones were brought into service, and it is believed that this number has not been exceeded during the first year of working of any other local telephone system. We have no exact data on this point, but if any of our readers can beat the Postmaster General's figures we shall be glad to hear from them. The post office main exchange is now the largest in the London area and has an ultimate capacity of 14,000 lines, over half of which is in use. Another exchange of the same size is to be built in the same part of the town. The necessity of providing for a rapid and continued growth of business has been kept well in view in the construction of the post office system. The work already carried out provides to a considerable extent for an increase up to 30,000 subscribers, and part of the plant, presumably the conduits, can accommodate even a greater number.

THE TELEPHONE IN THE COURTS

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

IS A SYSTEM REAL OR PERSONAL PROPERTY?

WHAT kind of conveyance is necessary in conveying the whole property and system of a telephone company, including pole-lines, wires, switchboards, etc., to the purchasers thereof? Or in other words, is a telephone system real or personal property? Or is it a chattel real? Is a deed the necessary instrument of conveyance, or is a bill of sale sufficient? D. A. U.

THE question is one that has not been settled in very many jurisdictions. The writer would say, however, that the weight of authority held that a telephone system was real property and it required a deed to properly convey it. The cases upon which he bases his conclusion all relate to telegraph systems, but telegraph and telephone systems are so similar that decisions affecting one can logically be applied to the other. In England a telegraph system is held to be real property. In Regina v. North Staffordshire Railway Company, 31 El. & El. 392, Lord Cockburn held that telegraph apparatus, consisting of posts driven into the ground and wires strung thereon, but in such a way that they might easily be disconnected, were fixtures.

The Court of Appeals of New York held telegraph poles with wires strung thereon to be attached to the soil of a highway and to constitute a part of a freehold. The question arose over an order of arrest in New York for cutting poles in New Jersey. The court held the cutting to be a trespass for which damages could be recovered only in an action of *quare clausam fregit*, which must be brought in New Jersey. American Union Telegraph Company v. Middleton, 80 N. Y. 408. Telegraph wires were held part of the realty and covered by a mortgage on a railroad, in the case of New York, Ontario & Western Railway Company v. Western Union Telegraph Company, 36 Hun. 205. The Circuit Court of the United States, sitting in New York, in a contract of amalgamation between two telegraph companies, held that the strung wires did not become part of the realty by annexation, because the two companies had agreed in effect that they should remain personalty, the poles being owned by one company, the wires by the other. Boston Safe Deposit and Trust Company v. Bankers' & Merchants' Telegraph Company, 36 Fed. 288. In Tennessee a telegraph line has been held to be realty for the purposes of taxation. Western Union Telegraph Company v. State, 9 Baxt. 509.

While the similarity of electric light systems to telegraph and telephone systems is great, the same rule has not always been applied to them. The Supreme Court of Illinois held that electric wires, lamps and poles, connected with machinery at the works of the company, were personal property, for the purposes of taxation. Shelbyville Water Company v. People, 140 Ill. 545. The courts of Kansas, Oregon, and Arizona, however, hold electric light wires and poles to be real property. Badge Lumber Company v. Marion Light & Power Company, (Kas.), 92 Pac. 476; Forbes v. Electric Company, 19 Oregon 61; Frechet v. Drake, (Ariz.), 12 Pac. 694.

TELEPHONE CONDEMNATION PROCEEDINGS.

THE Supreme Court of South Carolina has rendered a comprehensive decision sustaining the validity of the statute of that State providing for the condemnation by telephone companies of rights of way along rights of way of railroad companies. The South Carolina and Georgia Railroad Company and three other railroad companies brought suit for a permanent order for injunction to restrain the American Telephone & Telegraph Company from erecting its poles and wires along the plaintiff companies' rights of way, the telephone company being engaged in condemnation proceedings to obtain for itself a right of way along the rights of way of the railroad companies.

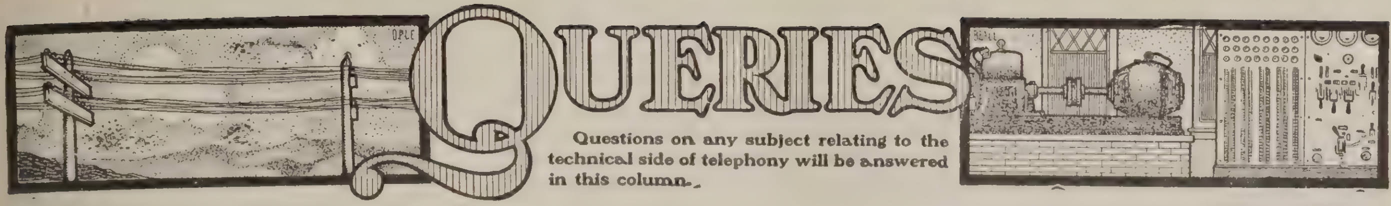
The plaintiffs contended that the telephone company's proceeding should be enjoined because it was an attempt to condemn a way over lands held by the railroad company in fee, for which the statute made no provision. The contention rested upon a strict construction of the terminology of the statute. Upon this question the court held that the term "right of way" was used to designate land where a railroad company had the legal right to run, and did run its cars, to wit, its physical roadbed.

The next objection of the railroad companies was to the petition of the telephone company in its proceedings to condemn. The court sustained the petition, holding, that stating that the posts would be sunk along the main line of the railroad between 12 and 40 feet from the center of the track for a distance of 100 miles, was a sufficient designation of the location of the line.

The railroad companies also contended that the whole statute was unconstitutional, because it did not afford to railroad companies "the equal protection of the laws" afforded to the citizens, nor provide for "due process of law." The inequality indicated by the plaintiffs was (1) the allowance of only one proceeding in one county to condemn a way in many counties; (2) the absence from the statute of any provision for an inspection by the jury of the right of way to be condemned. "Due process of law" was asserted to be lacking, because the act (1) did not permit judge or jury to decide if the lines to be erected were those allowed by the act, and, if not, the railroad company was without remedy; (2) did not provide for making all persons having an interest in the land parties; (3) did not provide that the telephone company should, after construction, help maintain the way. The court held the act constitutional, overruling all these objections. The court also held that a contention of the railroad companies that the erection of the telephone lines would endanger the lives of persons and interfere with the running of trains was without foundation. South Carolina & G. R. Co. v. American Telephone & Telegraph Co., 43 S. E. 970.

SUIT FOR REMOVING POLES.

THE Maryland Telephone and Telegraph Company has brought suit in the Superior Court of Baltimore, Md., against the Chesapeake and Potomac Telephone Company, asking $1,000 damages for the alleged removal of some poles belonging to the plaintiff on Pennsylvania Avenue. The declaration states that in December last the plaintiff secured the right of way along Pennsylvania avenue, between North Avenue and Clifton Street, and erected eleven poles there. It is alleged that during June last the defendant Company, without obtaining the consent of the plaintiff, and without any warrant for such a proceeding, removed the eleven poles, and has refused to restore them to their positions.



Questions on any subject relating to the technical side of telephony will be answered in this column.

DERIVATION OF "TELEPHONE."—(184.)

Will you be kind enough to give me the derivation of the word telephone?
E. H. D.

The word, telephone, is formed from the two Greek words, *tele,* afar, and *phonein,* to sound, or to speak, and therefore means far speaker. Words derived similarly are telegraph, from *tele,* and *graphein,* to write, meaning far writer, and telescope, from *tele,* and *skopein,* to see, meaning far seer. The word, telephone, was used many years before Bell's invention, as early, it is said, as 1820, by Charles Wheatstone, who used it as a name for a device for transmitting the sound of the voice for a considerable distance along a wooden rod.

WHAT ARE SNEAK CURRENTS?—(185.)

Will you inform me through the columns of your paper what is meant by "sneak currents"?
N. E. D.

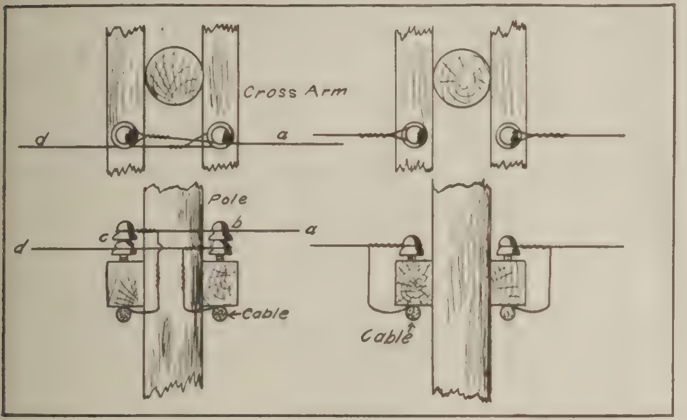


Fig. 186a.

A sneak current is a current from some outside source which finds its way into a telephone circuit. Usually they are of such small value that their presence is not readily apparent. The danger from sneak currents lies in the fact that if they are allowed to pass through a switchboard or any kind of a telephone coil for any length of time they will develop enough heat in the coil to ruin the insulation and perhaps start a fire.

DEAD ENDING ON DOUBLE ARMS.—(186.)

Please inform me the proper way to make a dead end on a double arm pole.
R. G. H.

You do not state whether copper or iron is used by you, so we will describe the methods used with copper. Of the several, the two illustrated are probably the best. In Fig. 186a the line from the east *a* is made to rest in the upper groove of the transposition of insulator *b,* and carried across to the upper groove in the transposition insulator *c,* around which it is passed and secured by a half McIntire sleeve, 2½ complete turns being taken. The line from the west *d* is made to rest in the lower groove of the transposition insulator *c* and carried across to the lower groove in the insulator *b,* around which it is bent and secured as already described. By this method the pull on the cross arm is directed against, and not away, from the pole. The disadvantage lies in the fact that at the point where the wire passes around the side of the insulator, on which it is not dead ended, a strain is put on the pin, at right angles to the length of the line, which should not be the case with pins used for dead ending. In the method shown in Fig. 889, standard insulators are used. The east wire is dead ended on the easternmost cross arm, while the west wire is dead ended on the westernmost arm. While in this method, the direction of the pull on the cross arm is away from the pole, yet it is to be preferred as being the neater of the two and less liable to produce crosses. When necessary, the pull on the arms may be compensated for by additional bracing.

A still better method of dead ending is to dead end both wires on one arm, using a transposition insulator for the purpose. When this method is used, the wires from the east and west should be dead ended alternately in the upper and lower grooves. This will equalize the strain in both directions. Fig. 186b shows the manner of making up copper wire around an insulator. The wire is wound around the insulator but once. The two previously mentioned drawings show a dead ending for a test station. When a test station is to be cut in the free ends of the line wire after being passed through McIntyre sleeves should be allowed to project for a length of 6 inches. These ends should be bent down at right angles to the line and are to be used in soldering to the conductors of the bridle cable, where a test station is cut in or to the drop wires where subscribers are cut in. Where iron wire is employed, and it is desired to dead end on a double arm pole, probably the best way is to use double groove insulators on both pins and wrap the wire from one direction in the upper grooves of the insulators in figure 8 fashion. The wire from the opposite direction should be made up in the lower grooves in the same manner.

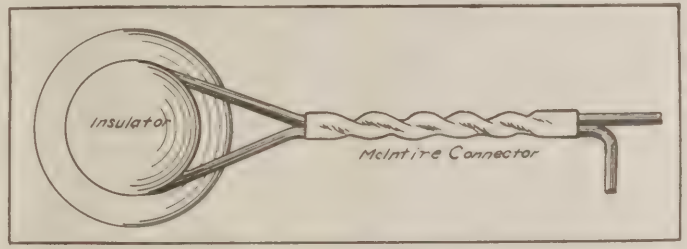


Fig. 186b.

THE MEANING OF A. W. G.—(187.)

What do the three letters A. W. G. mean as applied to wire? F. N. D.

A. W. G. stands for American Wire Gauge, which is the same as the B. & S. (Brown & Sharpe) wire gauge.

VIBRATIONS OF SOUND WAVES.—(188.)

What is the lowest rate of vibration and what is the highest rate of vibration of sound waves that will produce a continuous sound in a human ear?
D. F. D.

The lowest rate of vibration which will produce the sensation of continuous sound is about 32 complete vibrations per second. The highest rate of vibration is about 40,000 vibrations per second.

IMPEDANCE AND RETARDATION.—(189.)

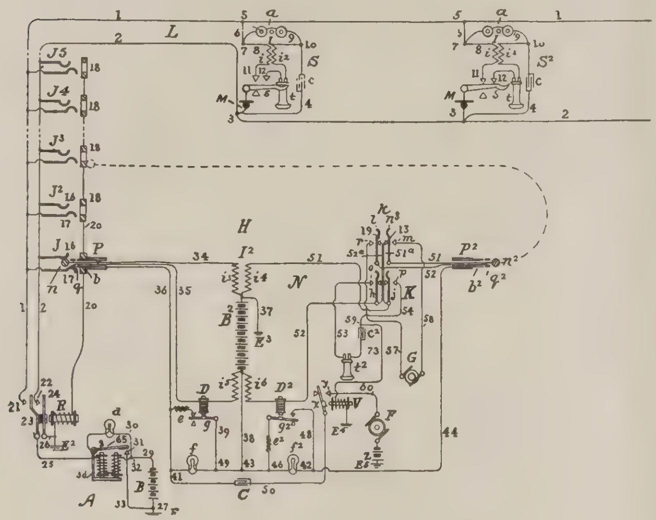
Can you explain on your query page the meaning of the words Impedance and Retardation? I have read several explanations but have not been able to clearly understand any of them.
G. O N.

We have had, lately, several inquiries of this nature, and as it would be entirely impossible to do the subjects justice in the limited space on this page, we have decided to run a series of articles on it. They will be written in a simple, straightforward style and will, undoubtedly, clear the subjects in the minds of many who in the past have not had an entirely clear conception of them.

PATENTS ISSUED

BUSY TEST FOR TELEPHONE SWITCHBOARD.

Joseph J. O'Connell, of Chicago, Ill., patents (No. 736,002) a busy test apparatus for telephone-switchboards and assigns to American Telephone and Telegraph Co. The object of this invention is to provide a special busy test for telephone switchboards intended for party lines. Mr. O'Connell proposes to provide one line signal and jack for each line upon one section of the switchboard and as many multiple jacks upon each of the other sections as there are stations on each line; thus the originating calls from all stations of one line are answered at one section while inward calls to every station are made individually from all sections. This invention provides a means whereby an additional and distinctive test is produced, which tells the operator that she is dealing with the party line. The arrangement of this circuit is shown in the figure. The circuit here represented is that of the well known common battery board. For the special busy test there is provided a conductor *73*, extending to earth E^4 from a point *59* on the telephone loop *53* between the condenser c^2 and the outer contact p of the key K and a relay V included in said conductor. There is also a special test signal branch circuit *50* arranged between the earth connection E^5 and a point *41* on the local cord conductor *36*, associated with the answering plug P, which branch circuit contains the condenser C between point *41* and the armature contact x and the rotary or other tonetest circuit breaker or continuous interrupter F and the battery z between the earth terminal E^5 and the fixed relay contact y, and is controlled by the relay V, passing thus through the switch-contacts x y thereof.



TELEPHONE RECEIVER.

William W. Dean, Chicago, Ill., patents (No. 736,076) an improved telephone receiver and assigns his patent to The Kellogg Switchboard and Supply Co., Chicago, Ill. The object of this invention is to provide a receiver of strong, durable patttern which will bear any amount of rough handling and which will simultaneously be easy and economical to manufacture. This receiver is shown in Figs. 1 to 4 inclusive. The receiver mechanism consists of two substantial bar magnets *6*, to the ends of which the pole pieces *11* are attached by means of a bolt *13* which passes through both bars of the magnets, the pole pieces and an intermediate filling piece *10*. This intermediate filling piece is shown in Fig. 4, from which it is seen that it also serves as a method of attaching the entire receiver mechanism to the inside of the receiver case. This is accomplished by screws which pass through the hole *17* Fig. 4 and enter the rubber of the case.

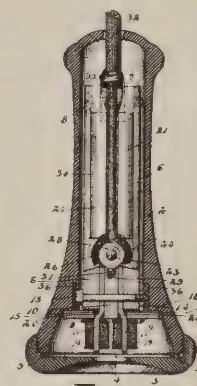


Fig. 1.

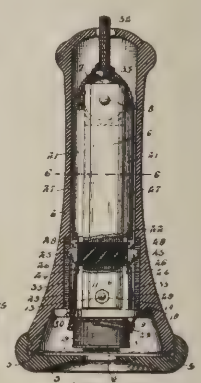


Fig. 2.

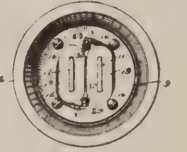
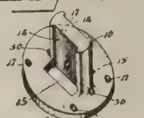


Fig. 3.

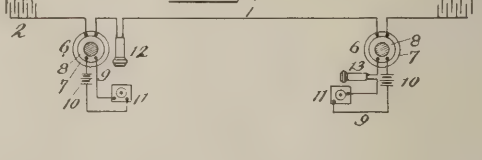
Fig. 4.



TELEPHONE SYSTEM.

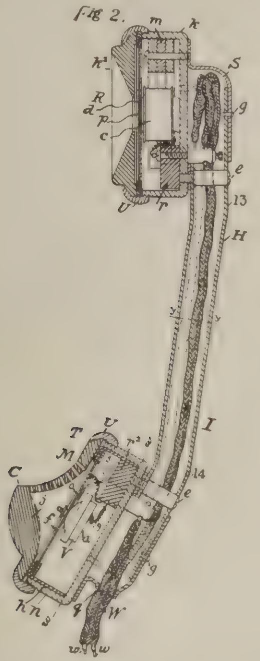
Robert A. Ripley, of Stamford, Conn., patents (No. 736,548) a telephone system and assigns his patent to Charles G. Burke, and John Q. A. Whittemore. This is another invention for telephones having a single wire without any return and it is assigned to Charles G. Burke (and John Q. A. Whittemore). This invention is shown in Fig. 1. At each end of the line the inventor provides a large capacity marked *2*. The transmitter circuit is the same as that of an ordinary substation, while the receiver may be placed either directly in the line, as shown in *12* or in the substation circuit, as shown at *13*. Owing to the capacities at the ends of the line the inventor expects to set up electrical oscillations, which travel to and fro between the capacities and thus transmit speech.

Fig. 1.



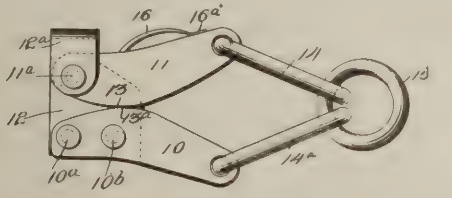
COMBINED RECEIVER AND TRANSMITTER.

John A. Barrett, Louis A. Falk, and Herbert E. Shreeve, of Boston, Mass., patent (No. 736,672) a combined receiver and transmitter and assign to American Telephone and Telegraph Co. The object of this invention is to provide a receiver and transmitter mounted together in such a manner as to be convenient for the use of linemen and others who wish a very compact piece of apparatus. The device is shown in Fig. 2 which is a longitudinal section. A hollow handle *H* is provided, which contains the conductors and which serves to join the receiver *R* and the transmitter *T*. The receiver is of the watchcase type and both receiver and transmitter are secured to the handle bar *H* by the caps *S* and *W*. The bar *H* is bent so that when the receiver is placed at the ear the transmitter will be at the proper distance from the lips. The transmitter is provided with a special cap *C*, so arranged as to deflect the sound waves upon the diaphragm.



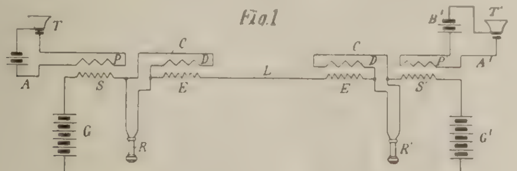
WIRE STRETCHING CLAMP.

Raymond Socks and S. P. Smith, of Shelbyville, Ky. patent (No. 736,453) an improvised device for stretching telephone wire. This devise is shown in the figure. The object of the invention is to provide a simple and inexpensive tool for holding wire in such a manner as not to damage the wire, and, at the same time, retain thereon a firm grip. There is a U-shaped forging ell *12*, upon which two jaws, *11* and *10*, are pivoted. These jaws are connected by two links, *14* and *14A* to a ring *15*. If a wire is inserted between the jaws, and tension applied to ring *15* the wire is firmly gripped.



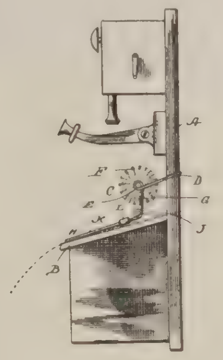
TELEPHONE SYSTEM.

Charles G. Burke, of Brooklyn, N. Y., patents (No. 736,489) telephone apparatus and assigns one-half of his patent to John Q. A. Whittemore. This is a patent for a system whereby the inventor claims it is possible to transmit speech from point to point by means of a single wire, without the use of any return circuit. It is a modification of other applications filed by the same inventor about two years ago. The system is illustrated in Fig. 1 and the transmitting circuit *T* is similar to the ordinary substation circuit consisting of a transmitter, battery and induction coil. The secondary of this coil is placed in series with the battery and line wire *L* as is shown in the diagram; there is no return circuit. The receiver *R* is supplied with another induction coil, the secondary of which is also placed in series with the line. The other arrangements of the circuit are sufficiently obvious from the diagram.



PAPER-HOLDING DEVICE FOR TELEPHONES.

Wm. H. Sherman, of Newport, R. I., patents (No. 736,556) an improved device for holding memorandum paper upon subscribers' sub-stations. This device is shown in the figure. The object of the invention is to provide a method whereby a continuous roll of paper adapted to the reception of telephonical memorandum can be conveniently secured at the subscribers' sub-station in such manner as to be readily used. The device consists of a wire spring, shown in Fig. 1, bent to form two bearings at *E*. A roll of paper mounted on an axle is inserted in these bearings, and the whole devise sprung round the back-board of the sub-station.



TELEPHONE NEWS FROM UTICA, N. Y.

By William H. Campbell, *Special Correspondent.*

JAMES S. BRAILEY, JR., manager of the Central Construction Company, of Wauseon, Ohio, was in Utica, N. Y., recently and transacted considerable business with the manager and directors of the Utica Home Telephone Company. He attended the meeting of the directors of the Rome Independent Company when it was decided to build an addition to the switchboard, giving capacity for 400 additional subscribers. The Rome company will now make every effort to install additional instruments. The meeting was also attended by Irving H. Griswold, second vice-president of the Albany Independent exchange. While Mr. Brailey was in Utica, he was introduced to H. H. Nicholson, manager of the Bell company. The two had a pleasant chat together, and in conclusion Mr. Nicholson congratulated Mr. Brailey on the fine plant in Utica.

The Utica Independent company is building a special toll line from Utica to Trenton Falls for the exclusive use of the Utica Gas & Electric Company. The line will be finished in one week. The Gas Company was dissatisfied with the service given by the Bell people, and decided to construct a private line. During the first day of the yacht race the three information operators answered 2,770 inquiries in regard to the results. The company made excellent arrangements for the transmission of the news and the service was appreciated by the public. Bell subscribers who inquired for the results at the Bell office were informed that no arrangement had been made to get the results.

EARNINGS OF THE CUYAHOGA.

THE gross earnings of the Cuyahoga Telephone Company, of Cleveland, Ohio, for the first six months of 1903, were $201,565.33; expenses and taxes, $104,967.39; net earnings, $96,598.14; interest charges, $58,115.05, giving a surplus for six months of $38,483.09.

The United States Telephone Company for the first five months of 1903 shows gross earnings of $151,726.32; expenses and taxes, $89,121.93; net earnings, $62,604.39; interest, $40,921.58, and net surplus, $21,882.81.

The Week's Messages.

FINANCIAL

BRADFORD, ILL.—The Milo and Bradford Telephone Company has increased its capital stock from $5,000 to $20,000.

DAHLGREN, ILL.—The Dahlgren People's Telephone Company has increased its capital stock from $2,500 to $5,000.

BOSTON, MASS.—The Cumberland Telephone Company reports as follows for the month of July: Gross earnings, $1,966,041; operating expenses, $1,351,753; net earnings, $614,467. The total number of subscribers on August 1 was 93,097.

BOSTON, MASS.—The Mexican Telephone Company reports for June as follows:

	1903.	1902.	Inc.
Gross	$22,595	$20,117	$2,478
Expenses	11,293	9,251	2,042
Net	$11,302	$10,866	$436
Four months ending June 30:			
Gross	$90,225	$78,547	$11,678
Expenses	46,504	40,972	5,532
Net	$43,721	$37,575	$6,146

The total number of subscribers on June 30 was 4,658, as against 4,167 in 1902, a gain of 491.

MINNEAPOLIS, MINN.—The directors of the Tri-State Telephone and Telegraph Company have declared a quarterly dividend payable September 1, on all stock of record August 22. Stock books will close August 22 and reopen again September 1. The Tri-State Telephone and Telegraph Company is the company organized to build the long distance toll lines which connect with the Twin City Telephone Company.

BETHANY, MO.—The Harrison County Mutual Telephone Company of Bethany has increased its capital stock from $9,000 to $100,000.

CINCINNATI, O.—The Cincinnati Telephone Company has increased its capital stock from $50,000 to $1,000,000. The company has made arrangements to connect with the United States Telephone Company long distance line. R. C. McCracken, Jr., is president of the company, and Robt. W. Seebaum is secretary.

FRANCHISES

BENTON, KY.—Three telephone franchises were sold here at auction to J. K. Greer, of Paducah, for $53, $55 and $57.

ABINGTON, MASS.—The selectmen of Abington will give a hearing in the town office on the petition of the Old Colony Automatic Telephone Company for a location. The company has been granted locations in Rockland and Whitman.

PLATTSBURG, N. Y.—The franchise given to J. Alexander Van Lieu, of Albany, by the common council of Plattsburg, has been turned over to the Clinton Telephone Company, capitalized at $50,000.

WAUKOMIS, O. T.—The Waukomis Telephone Company has been granted a franchise here.

COMBINATIONS

SCOTCHTOWN, N. Y.—The Citizens' Telephone Company, running into Scotchtown has been consolidated with the Crystal Run and Circleville line, and is now formed into a stock company.

MORRIS, N. Y.—The Butternut Valley Telephone Company has leased its lines of between forty and fifty miles to Harry McDonough, of Morris. By the lease the stock of the company becomes a guaranteed seven per cent. dividend-paying stock.

COPLEY, O.—W. F. Laubach and H. C. Spicer, receivers for the Sharon & Copley Telephone Company, have sold the line to E. A. Hawkins, of Copley, for $800.

POND CREEK, O. T.—A deal was completed at Wakita by which the Oklahoma and Kansas Telephone Company has purchased the business, property and corporate rights of the Grant County Rural Telephone Company. Mr. Pyle is contemplating making extensive improvements and extensions of his telephone company lines and business. Attorney P. C. Simons has gone to WAKITA to attend to the legal work connected with the transfer.

PERSONAL

C. ARMSTRONG, the manager of the Louisville, Ky., Home Telephone Company, was recently in Utica, N. Y., and there met Mr. Brailey, of Wauseon, Ohio, and Mr. Griswold, of Albany, N. Y. The three, together with Charles H. Poole, manager of the local plant, held an extended executive conference, but refused to give anything out for publication.

SAMUEL H. BAYLEY, of McKeesport, Pa., general superintendent of the Federal Telephone Company, has tendered his resignation to the company, to take effect the 15th of next month. Mr. Bayley will remain in McKeesport and expects to open up a general electric business here.

GEORGE G. HALL, manager of the Cumberland Telephone Company, at Louisville, Ky., has gone East for several weeks.

C. L. HIBBARD, who for the past few years has been Chicago representative of the Varley Duplex Magnet Company, has tendered his resignation, which took effect September 1st. Mr. Hibbard will take charge of a new company which will manufacture and handle several electrical specialties. The Chicago office of the Varley Company will temporarily be in charge of Mr. William Balke, who for the past five years has been chief inspector at the Varley factory.

RALPH JOHNSON, who has been engaged in expert telephone work in Minneapolis for the past few weeks, has gone to Waterloo, Ia., and will be there a month or more working for the telephone department of the Rapid Transit Company.

BENJAMIN H. SKINNER, who has acted as wire chief for the Utica, N. Y., Home Telephone Company for some time, has been sent to Kansas City.

GEORGE R. WEBB, president of the Maryland Telephone and Telegraph Company, of Baltimore, Md., has returned from a two-months' trip abroad. Mr. Webb visited France, England and Scotland. He returns much improved in health. During his absence the Maryland Telephone Company has been steadily pushing the extension of its service, and Mr. Webb plans still further improvements.

WILLIAM WILLIAMS has left the employ of the Black River Telephone Company in Lowville, N. Y., and accepted a position with the North Western Telephone and Telegraph Company in Carthage, N. Y. He will have charge of the construction work.

ELECTIONS

WAYNETOWN, IND.—The stockholders of the Waynetown Union Telephone Company met recently and organized with W. S. Fowler as president and the following six directors: Carlton D. Moore, C. A. Patton, Sam Biddle, Dan Harper, Joseph Fouts and Oscar Schenck.

FILLMORE, MO.—The directors of the People's Mutual Telephone Company have elected the following officers: Aaron G. Butler, of Fillmore, president; P. C. Wood, of Coffeen, vice-president; Euris Harris, of Coffeen, secretary; Stephen D. Canaday, of Hillsboro, treasurer.

MEREDITH, N. H.—At the adjourned annual meeting of the Meredith Telephone Company, held in B. Blaisdell's office, the following officers were elected: Clerk and treasurer, P. A. Ellsworth; directors, B. Blaisdell, B. R. Dearborn, J. T. Beede, S. M. Estes, E. Page. A dividend of 6 per cent. was declared from the previous year's earnings. The directors subsequently elected B. Blaisdell, president, and P. A. Ellsworth, manager.

YORKTOWN, N. Y.—The Yorktown Telephone Company stockholders met at Yorktown Heights and elected the following officers: James E. Rice, T. F. Tompkins, Edward E. Kear, E. Munson Frost, Floyd White, Albert Lee, James N. Strang, James J. Mead and Cornelius Pugsley.

THE WEEK'S MESSAGES—Continued

WAYNE, PA.—The Wayne and Pike Independent Telephone Company held their annual meeting of stockholders at the office of B. J. Killam, in Paupack, recently, and elected the following board of directors: B. F. Killam, H. W. Clark, Chas. Killam, Alva Quick, D. Bingham, F. G. Hames.

SIOUX FALLS, S. D.—Changes within the management of the Citizen's Telephone Company will place Charles Fantle, Jr., in the position of secretary and treasurer, rendered vacant by the recent resignation of E. W. Coughran. W. T. Doolittle is to be retained as president of the company and will have general supervision of the affairs of the company.

UNDERGROUND

WINTHROP, MASS.—The New England Telephone and Telegraph Company has petitioned for permission to lay underground conduits, wires, etc.

MISCELLANEOUS

COLUMBUS, GA.—The Columbus Automatic Telephone Company will open about October 15 with 700 subscribers or over.

DIXON, ILL.—The officials of the Jo Daviess County Telephone Company have changed the name of their company, and as complimentary to L. D. Pitcher, of Dixon, have made it the "Pitcher Telephone Company of Jo Daviess County."

EVANSVILLE, IND.—A committee of business and professional men representing the new Municipal Telephone Company at Evansville, who recently made a tour of a number of cities in the East, where the automatic telephone was in service, report as being highly pleased with what they observed of the workings of the automatic telephone. Captain Keller, speaking for the committee, said "that the members of the committee shared in the opinion that it would be but a short time until automatic telephones would be universally used." He could not say that it would be adopted by the Municipal Company, although the majority of the committee were very favorably impressed with the practicability of the automatic telephone.

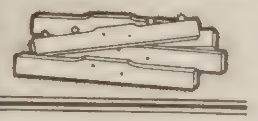
FLUSHING, MICH.—The building occupied by the Valley Telephone Company was set on fire by lightning. Loss about $4,000; insurance, $2,000.

CLEVELAND, O.—A representative of the Kellogg Switchboard and Supply Company was in Cleveland recently, and informed President Dickinson of the Cuyahoga Company that the switchboard will be in position by November 1. It will probably take a week or two after it is installed to get it in complete working order.

PORT CLINTON, O.—The purchase of the Independent Telephone Company's interests and the interests of other local telephone companies has enabled the new Ottawa County Telephone Company to better its service. The company's completion of its connection with Toledo by a streach of between forty and fifty miles of copper wire, gives additional facilities for communication between this and surrounding towns with Toledo.

WAUPUN, WIS.—The Wisconsin Telephone Company has advanced its rates from the Little Wolf River schedule. A petition has been circulated for installing a private system. The scheme is meeting with universal approval.

New Construction in the Field



OCILLA, GA.—C. J. O'Farrell has nearly finished installing the new telephone system for the Ocilla Telephone Company.

OMAHA, GA.—The Adams Telephone Co has just completed a long line from Omaha to Girard.

BLOOMINGTON, ILL.—The Interstate Independent Telegraph and Telephone Company is running a line from north to south through LaSalle, Woodford and Livingston counties.

ALPINGTON, IA.—The Cedar Valley Telephone Company, with headquarters at Waterloo, is putting in a local exchange of about thirty instruments, connected with an automatic switchboard. They will also connect with two farmers' lines recently incorporated by farmers and local business men residing at and near Aplington.

CARBONDALE, KAN.—Construction work on the Carbondale telephone line is being pushed to completion. The Carbondale Telephone Company will begin operating with over thirty subscribers. A central office will be established. The local wire will connect with the Farmers' Mutual line, which covers the agricultural district of Towhead and Fountain Ridge, and which in turn connects with Scranton. The company's officers are as follows: J. U. Sharp, president; Dr. J. N. Beasley, secretary; C. S. Pope, treasurer.

DODGE CITY, KAN.—A telephone line is being surveyed to Bucklin and through Ford City by the Dodge City Telephone Company. A number of telephones will be placed in Bucklin besides a central office. The total distance is twenty-six miles.

OAKHAM, MASS.—The Conant & Parker Telephone Company, which was recently organized with a capital stock of $500, commenced giving service on July 16th, with twenty subscribers, served by two exchanges, located in the towns of Oakham and Coldbrook Springs. The rates for service are $12 and $15 per year. The company intends to build a line to Barre, White Valley and New Braintill. The officers of the company are Frank S. Conant, manager; Clarence H. Parker, president; Harry B. Parker, secretary and treasurer, of Coldbrook Springs.

BALTIMORE, MD.—A new suburban telephone station will be established by the Maryland Telephone and Telegraph Company at Forest Park. This station will be opened to take care of the business of that company at Forest Park, Walbrook and Arlington. About $20,000 will be spent on the extensions to be made in connection with the new station.

BATTLE CREEK, MICH.—The Calhoun County Telephone Company has nearly completed its new state line from here to Pittsburg and from there down through West Virginia. Their line is now completed as far as Jackson. This company has also finished the conduits in the east end and will now start in the west side of town.

VIRGINIA, NEB.—The Virginia Telephone Company, recently incorporated with a capital stock of $4,000, expects to be operating two exchanges with about thirty-six subscribers, by the first of September. The company will continue building lines and will connect with all other Independent companies in the vicinity. The officers of the company are: John Dobbs, president; Wm. Holm, secretary, and Joel Dobbs, treasurer.

YORK, NEB.—The York County Independent Telephone Company has connected with the Filmore County Independent Company, and also with Independent lines at Beaver Crossing, Milford and Friend, Neb. The local Independent company has built east to Utica, where it expects to connect with the Independent lines connecting with Lincoln. On the north it has built into Stromsburg, where it has connected with the local Independent Company, and in a short time will be connected as far east as South Omaha.

COHOES, N. Y.—The Home Telephone Company has decided to build a line from this city to Crescent. The work will be begun at once.

HIGHLAND, N. Y.—The Highland Telephone Company is about to construct a line from Little Britain to Coldenham through the Drury Lane neighborhood. About twenty subscribers have been secured.

PERRY, N. Y.—The Perry Telephone Company is setting more than 150 poles in the northeast part of the town, and within a short time several of the farmers in that vicinity will be connected with the service.

POUGHKEEPSIE, N. Y.—The State Line Telephone Company is making arrangements to construct lines throughout Dutchess County in conjunction with the Dutchess County Telephone Company of this place.

ROME, N. Y.—A meeting of the board of directors of the Rome Home Telephone Company was held recently. The purpose of the meeting was to formulate plans for the construction of additional cable plant because of increased business and to build an addition to the switchboard. The system will be partially overhauled, and no expense will be spared in the repairs. The new section of the switchboard will accommodate about 400 subscribers.

WINFIELD, N. Y.—A meeting of the directors of the Edmeston & Winfield Telephone Company was held recently. It was decided to build the line from the terminus near this village if they can get the consent of the proper authorities. Also voted to withdraw all exchanges with other lines and make this an Independent line.

CALEDONIA, O.—The Marion County Telephone Company is rapidly pushing the work to completion on its plant at this place. A large amount of cable has already been placed and workmen are putting the switchboard up as rapidly as possible.

BIG SPRINGS, TEX.—The Western Telephone Company, recently organized here, with a capital stock of $15,000, started giving service on June 1st, 1903, with two exchanges and 250 subscribers. The company has one of the best plants in the state, and is building toll lines north and south from here. The officers are R. H. Kemp, president; E. B. Kemp, vice-president; C. L. Alderman, secretary and general manager; Philip Pettit, treasurer, and R. J. Compton, superintendent of construction.

THE WEEK'S MESSAGES—Concluded.

WILLIAM GRIMES, of Guthrie, O. T., has returned from a trip to El Reno, where he attended as a stockholder a meeting of the Topeka and El Reno Telephone Company. Numerous extensions by this company are being contemplated.

NEW BRAUNFELS, TEX.—The gang of men working on the telephone line between New Braunfels and Seguin have completed about half of the line. The Independent Telephone Company is also putting up a line between San Marcos, Seguin and Lockhart.

FRANKLIN, VA.—President William N. McAnge, of the Nansemond Telephone Company, is contemplating further extension of his lines. He was in Franklin recently, making arrangements to run his wires from there to Boykins and other points.

LAKE NEBAGAMON, WIS.—The Nebagamon Telephone Company has completed its plant in this city and has forty telephones installed. Work on the new system was begun about July 1. It is expected that by September 1 there will be at least sixty telephones in use. Telephones are being installed in the homes of farmers residing on roads leading to this city. The officers of the Nebagamon company are: W. S. Carr, president; B. Skare, secretary; Martin Hendrickson, treasurer.

SCANDINAVIA, WIS.—The Scandinavia Telephone Company, which was recently organized, will build a plant equipped for serving about seventy subscribers, that number having at present been secured. The company has closed a contract with the Stromberg-Carlson Telephone Manufacturing Company for the necessary equipment. The officers are: A. M. Peterson, president; O. M. Sannes, secretary; Neil Gunsten, vice-president, and R. J. Bestul, treasurer.

TRADE NOTES

The Automatic Electric Company, of Chicago, reports that its installing forces are now engaged in equipping the following plants with Strowger Automatic Telephone apparatus: Citizens Telephone Company, Grand Rapids, Mich., 5,000 stations; Northeastern Telephone Company, Portland, Maine, 2,500 stations; St. Marys Telephone Company, St. Marys, O., 500 stations; Cleburne Telephone Company, Cleburne, Texas, 640 stations; Southern Telephone Construction Company, Columbus Ga., 700 stations; University of Illinois, Urbana, 50 stations; University of Chicago, 50 stations; Armour Packing Company, St. Louis, Mo., 45 stations; Union Telephone Company, Ltd., Woodstock, New Brunswick, Canada, 110 stations. All of these will be in operation in a few weeks.

The Telephonine Company of America, with offices at 19 Union Square, New York City, is manufacturing a device to keep the mouthpieces of telephone transmitters in an antiseptic condition. The arrangement consists of a pad of an absorbent material which is arranged in a nickeled metal stamping supported in front of the mouthpiece by nickel plated metal arms of extremely light but substantial construction. The round stamping that holds the absorbent upon which the antiseptic liquid is poured is on a hinge so that it may open and close the mouthpiece. The antiseptic has a very pleasant odor. When the little lid containing the absorbent material, on which the antiseptic has been poured, is closed over the mouthpiece the vapors arising will exterminate any germs of disease which might have found way into the mouthpiece form the mouths of persons who had been using the instrument.

The F. Bissell Company, of Toledo, Ohio, realizing the fact that, upon the whole, catalogues issued by manufacturers are much alike, has introduced some novel ideas in the printed matter issued by it. A bad feature of catalogues issued in the past has been their inflexibility. They quickly became obsolete. They were left behind as the market progressed. How to obviate this undesirable feature has long been a difficult question and has now, for the first time, been solved by the F. Bissell Company. It has issued a catalogue in bulletin form, each bulletin applying to a particular line of goods. When additions to the book are desired they are easily made. The revised bulletin is inserted by the buyer who takes out the old bulletin, thus always keeping his catalogue up-to-date. He can easily keep apace with the market and, at the same time, has but one catalogue to handle. The consequent saving of time and nerve force is obvious. This company was the originator of the jobbers loose leaf price list which has become so popular. This taken with the new style of catalogue certainly covers the desired field. The company will send the catalogue and price list to anyone who asks.

The Delaware Charter Gurantee & Trust Company, of Wilmington, Delaware, is a corporation representing over $200,000,000 of capital, incorporated under the laws of Delaware, which represents companies that wish to be incorporated in that state. It performs all duties for its clients required of an incorporating company in the State of Delaware.

It is generally understood that it is advantageous to hold a Delaware charter. Some of the reasons for this being that:

A Delaware charter will allow the transaction of any lawful business in any part of the world. It may have a capital stock of any amount not less than $2,000, and may begin business when $1,000 of capital stock is subscribed. It will allow the holding of the annual meetings and the keeping of the original books outside of Delaware. The stock or bonds of a Delaware corporation held by a non-resident can not be taxed by that State. It will save much expense, as the cost of incorporating a $1,000,000 company in different States is as follows: Pennsylvania, $3,333.33; New York, $1,250.00; West Virginia, $410.00; New Jersey, $200.00; Delaware, $150.00.

Anyone writing to the company and explaining their circumstances will be given full information and advice regarding the formation of a company to suit the case in hand. Such information will be furnished without charge.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—For $30,000, if taken at once, telephone system of 650 subscribers, paying 30 per cent. and still increasing. Good long distance connection. The company owns toll lines through three county seats and several other towns. If you are in the market and mean business, write us by reurn mail. We must close out in 30 days. Some one will get a snap. Sixty-three miles of line will reach Omaha and Council Bluffs, with good long distance connections through Nebraska. Address Box 944, Corning, Iowa.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

THE LIBRARY OF CONGRESS desires to secure Volumes 1, 2, 3 and 4 of The American Telephone Journal for its file. Parties' who may have these volumes, or parts of them, which they would like to dispose of, please communicate with the LIBRARIAN OF CONGRESS, Washington, D. C.

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau street, New York City.

POSITION.—Assistant Manager of New York City exchange (3,500 subscribers). A No. 1 business experience, technical education, desires good opening, Middle West or East. Practical maintenance and construction experience. Age, 30. Address Box 80, The American Telephone Journal, 116 Nassau street, New York City.

POSITION.—Competent telephone man desires position. Has had twelve years' experience in underground and aerial construction, estimating, managing plants, etc. Address Box 80, The American Telephone Journal, 116 Nassau Street, New York City.

The American Telephone Journal

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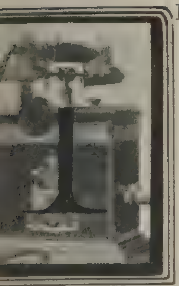
VOLUME VIII *SATURDAY, SEPTEMBER 12, 1903.* *NUMBER 11*

A SCOTTISH TELEPHONE EXCHANGE

By Carl Brewster.



THE method of building exchanges in Scotland is somewhat different as regards the design of apparatus from that employed in the United States, and is an interesting study. The subscriber's sub-station, indicated in our initial letter, is a somewhat curious affair in American eyes. The old and familiar magneto remains, and the receiver and transmitter are united on a single handle. This is a favorite practice in Europe, but has not been found acceptable in America.

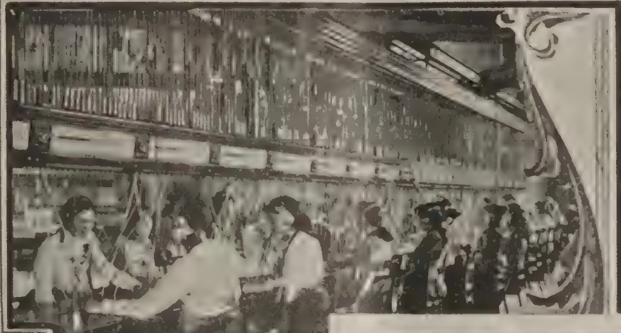
It is difficult to arrange an instrument thus designed to span the distance between the mouths and ears of all people, and so when different parties use a combined instrument of this description there is likely to be much variation in transmission. In America we tend to be strictly practical, and so subscribers' sub-stations sets are severely played.

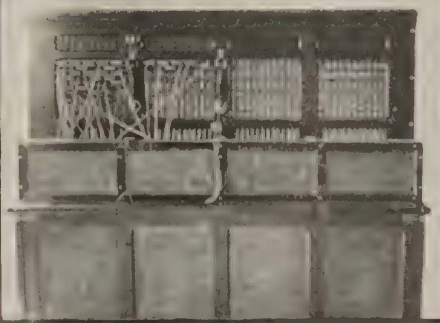
Whether the Scotch instrument, as the illustration indicates, would be far more ornate were the additional expense entailed, is more a general manager's question than one which interests an engineer or a manufacturer.

In one photograph the terminal room is shown. The cable entrance is readily seen on the left of the distributing board to which the underground cables converge, and are terminated in the frame pophead manner, from which the pairs are distributed upon the outside of the main frame. This, and the former vertical type, are equipped with the well-known carbon plates and heat coils. From the switchboard side of the main frame, the cables pass to the intermediate board, and to the relay racks of the switchboard.

A view of the interior of the principal office is also shown. The most striking feature is the design of the switchboard which provides the jacks in a series of horizontal tables, on each side of which the operators sit. Those who remember the old form of law switchboard will, at once, recognize the similarity between that board and the one shown in the picture. American practice has believed that the horizontal form of jack was objectionable on account of its proneness to catch and hold dust and dirt. The accumulation is liable to cause much complaint due to open lines. This criticism largely originated when Seeley's jacks were

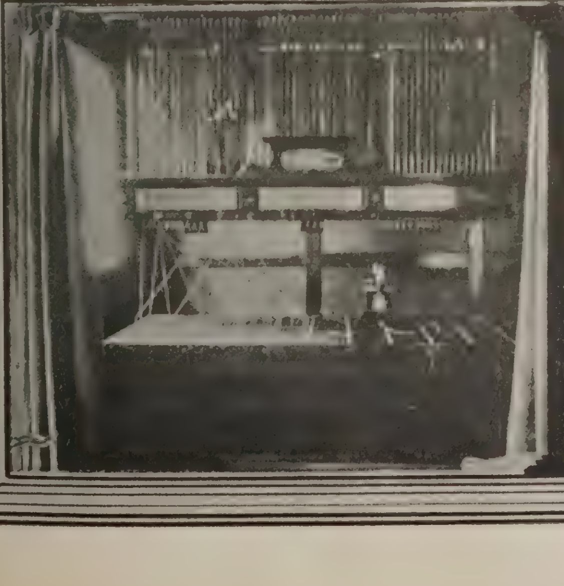
The Main Switchboard Showing the Overhead Cords.



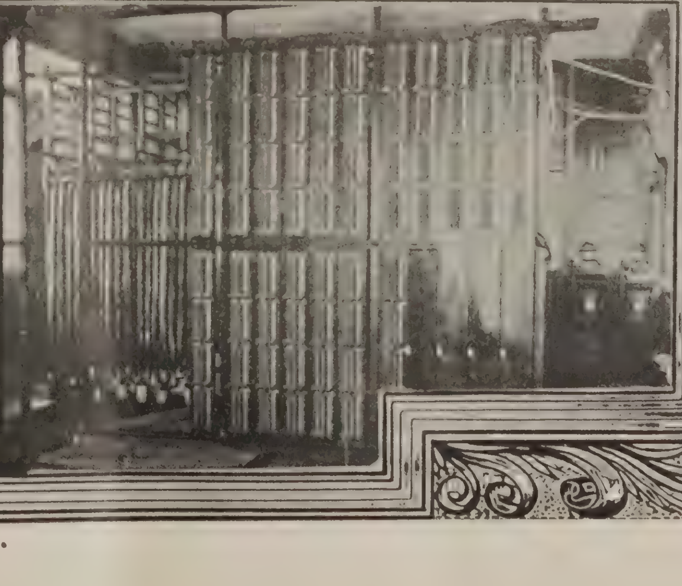


The Call Wire Switchboard.

A Smaller Horizontal Switchboard.



The Cable Entrance and Distributing Rack.



exclusively used, and certainly would not be so serious an obstacle with bridging circuits. In many respects the horizontal board is more convertible and convenient for the operators. Placed before a table of this kind, an operator can do more work than on a vertical board, over which she must make longer reaches. But, on the other hand, the fact that the cords are placed overhead is a handicap, as the operators must move further and make a greater effort to pull out a vertical cord that appears before her.

Steel Cable Rim.

A novel feature is the call wire distributing switchboard, shown. This, to all intended purposes, is a small switchboard through which all of the call wires from the entire switchboard converge, and in which they terminate in jacks. From the maiin switchboard, circuits are extended to the call wire distributing board from each operator's position through every call wire. Every operator's position appears in the call wire distributing switchboard. The cords are merely plain twin conductors, into which a listening and ringing key is cut. By this means, any call wire can, in a moment, be connected to any call wire's position, and a very flexible means provided, whereby the manager could adjust the trunking positions to any variation in the exchange load. Many features of the installation thus presented afford food for reflection, from which American telephonists may derive some hints as to possible methods. The world over, the paper cable is employed for urban subscribers' lines, and in the Scottish plant under consideration several thousand miles of 200 pair cables are employed, which converge towards the exchange, and run up the exterior wall of the building in a chute of structural iron, as shown in one of the pictures. This method was formerly common in American practice, but it is now considered that exchange entrances so designed are too greatly exposed to injury from fire or from attacks of the malicious to be warranted. American designs of the present build cable chutes in fireproof brick walls inside central office buildings.

MISSOURI & KANSAS CO. IN TROUBLE AT TOPEKA.

By J. H. Green, *Special Correspondent.*

UNLESS George Bayless, manager of the Missouri & Kansas Telephone Company, at Topeka, Kansas, can show that he has not committed a fraud against the city he will probably be placed under arrest and an injunction taken out to prevent the Kansas Long Distance Telephone and Telegraph Company from completing its line into North Topeka. Over a year ago the latter company asked the city council of Topeka for a franchise to run a telegraph and telephone line into Topeka. The franchise was refused. Recently, as Mayor Bergundthal and City Engineer McCabe passed through North Topeka, they noticed a new line of telephone poles over the route, for which the franchise had been asked, by the Kansas Long Distance Telephone & Telegraph Company. A closer inspection showed that each pole bore the following label in stencil: "The Kansas Long Distance Telephone & Telegraph Company—Post No Bills."

The mayor then made investigations and found that on August 5, George Bayless, of the Missouri & Kansas Telephone Company, had taken out an excavation permit for the erection of poles over exactly the same route that the long distance company wished to erect its line. Although the Missouri & Kansas Telephone Company has a franchise for erecting poles on any or all of the streets of Topeka, the mayor thought this sufficient evidence that Mr. Bayless had taken out a permit to accommodate a company that had no franchise. Mayor Bergundthal then demanded an explanation of Mr. Bayless, who said that there was a "traffic arrangement" between the two companies. "Well, that won't go," said Mayor Bergundthal, "and I am going to have you arrested for taking out an excavation permit under false pretenses and an injunction served to prevent further work." Manager Bayless assured the mayor that the work would be stopped until a satisfactory explanation could be made and the arrest did not follow. The second day following, the mayor and city engineer went again over the ground to examine the poles and found that the stencil mark of the long distance company had been carefully shaved off of every pole and the mark of the Missouri & Kansas Company placed on in its stead. This renewed suspicions. Further examination showed that additional poles had been set, and that the line extended across North Topeka. The line of poles set last winter by the Kansas Long Distance Telephone & Telegraph Company was built up to those set by the Missouri & Kansas Telephone Company, and these poles still bear the mark of the long distance company—the same mark that appeared on the poles set by Mr. Bayless before it was shaved off. Having been asked by the mayor regarding the stencil of the long distance company being placed on his poles, Mr. Bayless said that the Missouri & Kansas Telephone Company had acquired the Kansas Long Distance Telephone & Telegraph Company, and the stencil with it.

The mayor and the city engineer were angry and threatened to cut down the poles, as they believed it was a scheme to get a company into Topeka which had been refused a franchise. However, they have agreed to let the matter rest until Mr. Bayless can have an official from the Kansas Long Distance Company go to Topeka from Kansas City and explain that that company has been acquired by the Missouri & Kansas Company. A way of explaining the favor that one company is attempting to do for the other is the poor condition of the Missouri & Kansas Telephone Company's long distance line between Kansas City and Topeka and the probability that the use of the new line would be granted. The old company is badly in need of a good line to Kansas City.

When City Attorney Spencer took the matter up with Mr. Bayless, he secured little satisfaction, as Mr. Bayless was not at that time sure, whether or not the company by which he was employed, had acquired the other company, but left it to be settled until an officer from the other company should come. "It looks as if there might be an irregularity here," Mr. Spencer said, "and I think the Kansas Long Distance Telephone Company will have to show that it is a part of the Missouri & Kansas Telephone Company before it can complete its line here. However, I can tell nothing about it until I know of the relations existing between the two companies."

Mayor Bergundthal is considerably agitated, and will see that the long distance company is kept out if there is any way to do it. "It looks to me," he said, "like a clever piece of work by the long distance company to get into Topeka. When it asked for its franchise, the statement was made that it wished only to come as far as Topeka. Now the poles are set entirely through the city. I do not see what there is for the company out there if it came only to the city limits. The cutting of the labels off the poles is another suspicious action. At first Mr. Bayless said the Missouri & Kansas Company owned the Kansas Long Distance Telephone & Telegraph Company and now does not know whether it does or not. The whole proceeding looks as if there was something wrong, and the matter will be carefully investigated."

The Kansas Long Distance Company, whose ruling spirit is Fred. De Land, is incorporated for over a million dollars, with headquarters at Pittsburg, Pa. As the other company is only a local company, the city officials are of the opinion that there is some trickery, and will make the company fight to get the use of the new poles. This is evidently what the telephone companies intend doing, as local attorneys have been employed for the case.

THE MUNICIPAL ELECTRICIANS' CONVENTION

ATLANTIC CITY is a fine place in which to have a good time, but not in which to hold a convention. For this reason, the International Association of Municipal Electricians deserves great credit for its most successful one held at the Hotel Rudolf—its eighth annual. September 2, 3 and 4, were divided into a programme of business, pleasure and social intercourse designed to suit everyone. But the Rudolf is a fine hotel, and 'tis said that this summer the elite of the country have congregated there. But the assertion that this was a successful convention in every respect, is the truth and the whole truth.

And Mr. Frank Mason, of the Brooklyn Police Department, is glad, for he was given an opportunity to register a vigorous kick against the wretchedness of the Bell service, particularly its long distance service. Mr. Mason is the possessor of a duck farm on the outskirts of Utica, N. Y., about three miles from the city. Here his family lives during the summer season. Mr. Mason of course wanted to have telephone connection with his family, so he asked the Central New York (Bell) Telephone Company to build a line to his farm and furnish long distance service. To his surprise, the company refused. Mr. Mason therefore put up a line of his own connecting with the Bell's and now pays two dollars a year rental for the instrument, in addition to all toll charges. He called up Mrs. Mason several times, but one day, on calling the long distance operator calmly informed him that Mr. Mason didn't have a telephone. After arguing and pleading for an hour and a half he convinced the operator that he did have a telephone on his Utica duck farm and was given the connection.

WEDNESDAY'S BUSINESS AND PLEASURE.

The convention was formally opened at 9:30 Wednesday morning with a prayer by the Rev. Chas. D. Sinkerson. Hon. Franklin P. Story, mayor of Atlantic City, delivered a welcoming address which was responded to by past president of the association, A. S. Hatch, of Detroit, Mich. The president, Wm. H. Thompson, of Richmond, Va., then addressed the convention, after which the report of the executive committee was heard and acted on.

At twelve o'clock the convention, in a body, donned bathing attire and sported in the salt sea waves.

For two hours Wednesday afternoon, commencing at 2 P. M., what was designated the "Question Box," was the feature, and it was one of the most valuable features of the meet.

At four P. M. a long line of rolling chairs was in waiting at the Rudolf to take the delegates and guests for a trip the entire length of the board walk. In the evening "amusements along the board walk" was the schedule and we think it was strictly carried out. If not it was not the fault of the entertainment committee, for it distributed a liberal supply of tickets admitting to nearly every attraction on the board walk.

THURSDAY WAS INSTRUCTIVE.

Some of the convention assembled at 9 A. M. Thursday morning, but the most assiduous of the ticket spenders straggled in a little later. They all wanted to hear the paper of past president, A. S. Hatch, on "Records and Reports." The ladies and other guests were taken care of by an elaborate program of sailing, boating, etc., and at 12 o'clock, again there was bathing.

At two P. M. there was 2 hours' topical discussion on line construction opened by past president Will. Y. Ellett, of Elmira, N. Y. After this the entertainment features on Young's Pier were thrown open to all Municipal Electricians or anyone with one of their souvenir badges.

At 8 P. M., A. Frederick Collins, of New York, delivered a lecture on Wireless Telegraphy, illustrated by lantern slides and full working apparatus. It was much appreciated.

FRIDAY, THE END OF THE CONVENTION.

The entire day, practically, was devoted to the associate members, the morning being occupied by a paper from Mr. H. W. Pope, of the Bell Long Distance Company. Mr. Mason, of Brooklyn, and several others discussed the paper, especially that phase of it in regard to the employment of the high salaried operators in police telephone systems, Mr. Pope asserting that a $9 a week girl operator could do the work as efficiently as a $2,000 a year sergeant. Mr. Mason maintained that it was necessary to have the high salaried operators for many reasons, and in this he was upheld by the other delegates. Mr. Pope also took occasion to reply to the criticism that appeared in THE AMERICAN TELEPHONE JOURNAL recently in regard to the $20,853.20 a year contract of the New York Telephone Company for supplying 661 police telephones in street boxes. Mr. Pope admitted that this might be a rather extravagant sum for the service furnished, but said it *probably* included future equipment.

On this day, the delegates again went bathing at 12 o'clock, and upon assembling again at 2 P. M., heard the treasurer's and various committee reports. Numerous letters were read by the secretary from points all over the country, asking the electricians to hold their next annual meeting in various cities. The place of meeting was left to the decision of the executive committee. At 3 P. M., the delegates took the trolley cars for South Atlantic City, where a clambake was the attraction. At 8:30 the Cooper-Hewit mercury vapor lamp and static converter was demonstrated at the Rudolf, and the intense pale green light of this wonderful lamp filled all with an awestruck feeling, besides turning everything in its pale to a ghostly hue. Friday evening there was also a demonstration of that wonderful invention, the Poulsen telegraphone. The telegraph and telephone men present were greatly interested in this exhibition.

Officers for the ensuing year were elected as follows: President, A. C. Farrand, Atlantic City, N. J.; 1st Vice-President, W. M. Petty, Rutherford, N. J.; 2nd Vice-President, S. F. McDonald, Ottawa, Can.; 3rd Vice-President, F. E. Pierson, Morristown, N. J.; 4th Vice-President, F. A. Cambridge, Winnipeg, Manitoba; Secretary, F. P. Foster, Corning, N. Y.; Treasurer, Adam Basch, Newark, N. J.

Executive Committee: Jerry Murphy, Cleveland, O.; J. B. Yeakle, Baltimore, Md.; M. J. Donohue, Niagara Falls, N. Y.; F. C. Mason, Brooklyn, N. Y.; G. H. Halderman, Indianapolis, Ind.; J. W. Aydon, Wilmington, Del.; W. H. Thompson, Richmond, Va.; Wm. Crane, Erie, Pa.; W. H. Bradt, Troy, N. Y.

Financial Committee: C. E. Deihl, Harrisburg, Pa.; Jas. F. McElhalm, Lowell, Mass.; Jas. F. Burns, Schnectady, N. Y.; Louis Gascoigne, Detroit, Mich.

The manufacturers were represented as follows: Paul W. Bossart, R. S. Mueller, Kellogg Switchboard and Supply Co., Philadelphia; E. B. Roulet, Osbourne Flexible Conduit Co., New York City; Wm. C. Banks, Gordon Battery Co., New York City; S. B. Van Ranst, Crouse-Hinds Co., Syracuse, N. Y.; Romaine Mace, The Okonite Co., New York City.

COUNTY ASSOCIATION FORMED IN MISSOURI.

MANAGERS of the various telephone exchanges of Chariton County, Missouri, met recently in Salisbury, and formed the Chariton County Telephone Association. E. M. Carter, of the Keytesville exchange, was elected president, and C. A. Clarkson, of the Pee Dee Exchange, was chosen secretary. The general purpose of the organization is to promote harmony among the telephone interests of the county by adopting rules and regulations that will prove agreeable to all parties using or operating telephones. The association will, in the near future, publish a telephone directory that will be full of telephone information and will contain all the rules adopted by the organization. The association adjourned to meet at Dalton, November 18, 1903.

THE ECONOMY OF TIME*

By Henry W. Pope.

SINCE my last talk to the members of this Association at the Niagara Falls meeting, the use of the telephone has increased to enormous proportions, establishing itself as an absolute necessity in business as it is conducted to-day. To January 1, 1903, there were upwards of 1,277,983 stations in operation in the Bell system alone, using the service, on an average, of 7 3/10 calls per day per station, or 3,002,000,000 times yearly.

This growth may be attributed to a number of perfectly legitimate causes, but the perfection to which the service has been brought by the installation, almost regardless of expense, of what is known as the common battery or central energy system, may be regarded as one of the most potent reasons. Calls are made with more ease and convenience, and the ten seconds previously consumed in reaching the operator's ear is now reduced to three seconds, and the disconnection period to even less time, while the liability of errors and the causes for complaint are minimized.

If the past century is to be credited with one thing more than another, it is the wonderful progress that has been made and the results accomplished in the saving of time and labor, by the invention of devices and instrumentalities in more ways than it is possible to enumerate or comprehend. Those engaged in the electrical field and more familiar with its development, are apt to argue and maintain that the greater progress has been in electricity, and this may be true, but whether the resultant benefits to mankind are greater is open to question.

Of the telephone it has been said by a most competent observer: "There was never a greater invention than the speaking telephone." Mr. Lockwood, in a discussion last January, before the Institute of Electrical Engineers, referred to the observations of an orator in Washington in this wise: "That while he felt that he could get upon familiar terms with a dynamo at a respectful distance, and while to some extent he could appreciate the electric telegraph as being something which even he was capable of measurably understanding, when it came to the telephone he was stricken with awe, for, as he said, while we have it on the authority of the Master that none of us by taking thought can add one cubit to his stature, Alexander Graham Bell, by taking thought, had added not merely a cubit, but hundreds of miles to the length of our tongues and ears."

The telephone, in whatever direction it has been applied, has filled a long-felt want, providing a quicker, and if you will pardon the egotism, a superior grade of service. The telegraph, on the contrary, while maintaining its position as a means of transmitting intelligence rapidly, has not, so far as the ordinary sender of a commercial telegram is concerned, made any visible progress in the speed of transmission and delivery since the days of '65, except such as may be due to the typewriter and bicycle.

Passing to the reception and delivery of the telegram, it would seem possible to provide a blank form for the reception of the typewritten message, which would admit of being folded and sealed to show the address, eliminating the necessity of an envelope and the labor, time, and expense involved in providing and addressing it: or an envelope with a space cut out of the face side, and covered with transparent paper, so that when the telegram was properly folded the address would be visible from inside the sealed receptacle. In filing the telegram for transmission, the sender should be asked to elect whether the delivery should be by messenger or telephone, and this indicated by some character or symbol would be the authority for the distant office. Every business man, every business office or factory of any account in the United States has a telephone, and this will be true to a considerable extent with residences and farms in the near future. As the public were apprised of this feature, the messenger would be gradually relegated to other fields of industry, and the greatest element of delay eradicated.

If the same studious interest were employed in minimizing time somewhat along the lines I have suggested, in the telegraph business as in the case of the telephone, it would unquestionably lead to an enormous increase of telegraph business revenue. You, gentlemen, represent special fields, and fields in which economy of time and accuracy of information are important factors. What are a paltry 500 fire alarm boxes in a city for emergency use as against 15,000 telephone stations?

You will contend, I presume, that it would be the height of folly to throw this telephone system open to the public for emergency purposes because of the average person's excitability, but bear in mind the average person has only to take down his telephone and talk; an excited individual usually can talk—his excitability makes him talk too fast—that's all—but it's not too fast for the telephone, and you have the opportunity to verify your information as you cool him down. If in his excitability he pulls a box which a more collected person would not do, you have no means of recalling the act—the signal is in and the trouble commenced. To arrive at a condition of things which would admit of encouraging and advocating the use of the telephone for emergency purposes, you must first put your house in order.

My experience is, that municipalities economize in everything essential and squander in non-essentials. They economize in the use of telephones to the extent, generally speaking, of disgusting every telephone user through inability to get a connection. A city telephone is pretty generally "busy," and its value or influence should only be considered as a means to get out of doors. The possessor of a telephone knows who and what he can reach himself, but he forgets and is unmindful of the other fellow that wishes to reach him. Sufficient terminals should be provided, especially for emergency purposes, restricted absolutely to inward business; then people finding always an inward path, will grow more and more to use the telephone. This will reduce the office labor, because telephone conversations are short. The telephone saves time, as I have said before, in whichever way you look at it.

The proper solution for these increased facilities is the installation of a Private Branch exchange, which provides you with ample trunking facilities beyond possibilities of congestion, ample telephones at a nominal charge and a complete censorship, through your own operator of every connection.

The theory generally prevailing that the multiplicity of telephones is a bother and nuisance because one can be called up at all times and upon all sorts of matters is incorrect. Telephone conversations, as experience teaches, last but a few seconds on the average. If a person has business with you, he will either congest your office and business with his presence or write you a letter which will involve time and expense to answer. Whereas, if it is convenient to reach you by telephone, you have the advantage of dealing with him at long range, with extreme brevity, and the expression of your countenance cannot be discerned to your disadvantage.

The inquirer will not drift off into politics or extraneous matters; the conversation will start with the usual compliments and get right down to business. More and better business in the ordinary transaction of affairs can be handled by telephone and you are not disturbed in the quietude of your sanctum.

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*Abstract of paper read at the Eighth Annual Convention of Municipal Electricians at Atlantic City, N. J., Sept., 2, 3, 4.

It does not follow that the installation of a private branch exchange involves increased telephone expense. Oftentimes a considerable saving can be effected by the elimination of high priced direct exchange connections and passing such service through the private branch exchange.

What delay there may be under existing conditions, and what unreliability may have been experienced in passing telephone emergency calls, is not unlikely due to one of these causes. (1) To the trunking of such calls from one exchange to another similarly to a subscriber's call. (2) To the lack of sufficient terminal facilities for the reception of calls. (3) To the want of perfection of detail and handling of call. (4) To neglect to systematically verify the information. Another feature I do not wish to overlook is the possibility of instantaneous conversation with all your suburban surroundings, with the chiefs of nearby and distant cities. You know the possibilities and advantages of this service and are familiar with its reliability in comparison with other means of communication.

The signal system has many good points, but it is limited in its accessibility, and hence slow to accomplish certain results. It lacks elasticity and involves spending two dollars where only one is necessary. It may be a radical suggestion, but receive your calls by telephone and send out your companies singly or in pairs, by signal. It will come to this eventually, and every telephone subscriber will send his emergency calls by telephone and forget there ever was a fire box and the subscriber will do this because of his having already learned by experience that it is the quickest method on earth of communication. The subscriber also knows that he can complete his call to the fire department before it would be possible for him to get out the front door. He has used the telephone, figuratively speaking, 41 years, and it has failed him not once in that time.

The members of this Association, I assume, are interested in any measure likely to enhance the value of the cities' protective measures to its citizens. You are closer in your relations to them than the employer of a corporation, serving the public for a stated compensation. The corporation caters to the many. You are the representatives of the voters. Anything you do to enhance their interests is likely to redound to your benefit, and it often produces a more reliable "pull" than the energies of any politician, be he Republican, Democrat, or Reformer. You should strive, therefore, to keep pace with modern developments. It is not well to sit back and assume, as they do in Europe, that because certain duties have been performed in a certain way from time immemorial, that there is no better or no improved way. Look about you—see what others are doing—experiment and convince yourself. Profit by the experience of the railroad companies: they handle the lives of people, as well as property. Note how they are developing the use of the telephone, while only a few years ago it would have been considered high treason to have moved a train by telephone. Other means proved too slow, and not sufficiently elastic for the purposes used. The emergency departments of some cities seem to have reached perfection; they are well up in discipline and in the economy of time, but this economy of time is in response to the receipt of the information and not in its inception and transmission.

A prominent fire department official of international reputation is authority for the statement that the "missing link" in the fire service of to-day is the time that elapses from the breaking out of a fire until the alarm is turned into the department. If he had dwelt upon this subject at greater length, he would have made it clear to you that the "missing link" was the telephone, because of its availability and accessibility and its suitability to convey not only the alarm, but any necessary particulars in connection therewith.

You are familiar with the drill and discipline which produces such surprising results in the dispatch of fire engines after the alarm is received. Apply the same energy in the collection of these emergency calls and you will obtain results that will surprise you. As I said before, some localities have 30 telephone stations to the hundred people; few have less than three and none less than five, eventually—make a mental calculation of the insignificance of your box system.

I will not take up your time discussing other possible advantages in the utilization of the telephone, although I might say to you that it is entirely feasible and practicable to utilize automatic telephonic devices in connection with the telephone exchange systems which would prove accurate and reliable and clearly in advance of the automatic auxiliary devices of to-day, but these attachments are objectionable from a telephonic point of view. So, there is, you will observe, a possibility that some day the midnight solitude of the fire department central offices will be disturbed by the clear and distinct announcement somewhat in the style of Hamlet's ghost: "Fire 41144—key under the doormat—beware of the dog."

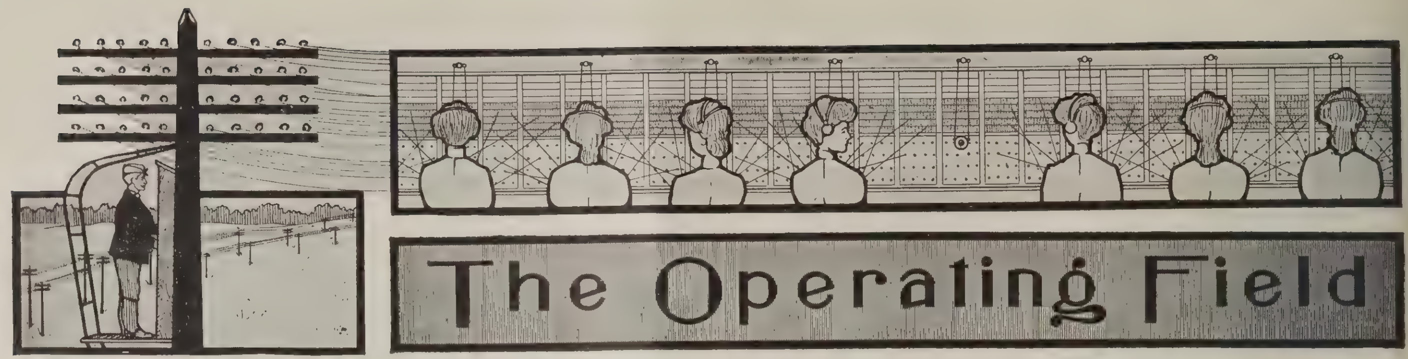
In the excitement of the assassination of President McKinley at the Pan American Exposition, the ambulance call was practically instantaneous, and the news was in nearly every important city in less time than I have consumed in dictating this. Yet there was no signaling system involved, and if there had been it would not have distinguished as between an insignificant injury to a laborer and that of mortal injury to the President of a great nation. There would have been no unusual exertion, but the words from the station in the Temple of Music, "My God, the President is shot," thrilled and moved everybody to action. And all this in less time than would be occupied in the revolving of a circuit breaking wheel twice after you had discovered the box from which to transmit the singnal.

Your experience teaches you that it would always be advantageous to know at the inception, whether the alarm is for a disaster or an ordinary emergency, and you know that minutes will elapse and valuable time be lost before particulars are available after the signal is received. In arriving at these conclusions, with reference to telephone possibilities, I have not intended to convey the impression that alarm boxes are passe or unsuitable for the conditions of to-day. There are conditions likely to continue as long as water runs and grass grows, which will be best to be met by street alarm boxes; for instances, in business districts at night or during holidays, but their value will be greatly enhanced if telephonic connection is established in them, that the officer on post may be in position to communicate information to the department, hospitals, or elsewhere, as readily as the fixed signal. It is the combination that is advocated, and when provided, the encouragement of the public to use either facility and with equal consideration and confidence.

ABOUT THE NEW CINCINNATI CO.

DEVELOPMENTS the past week indicate that Cincinnati is to have an Independent telephone plant at an early date. The Philip Fitzsimmons Telephone Manufacturing Company has been reorganized. Its capital stock has been increased from $5,000 to $6,000,000, and a fight for a permanent foothold in Cincinnati for the Independent company is promised from now on. Philip Fitzsimmons and D. J. Hauss, who have been fighting the battles of the Fitzsimmons company for months, are retained in the list of directors, and Mr. Fitzsimmons is still president.

The new factor is W. C. Prickett, elected to the position of vice-president and general manager. Mr. Prickett is an Easterner and represents New York capital which has become interested and which has just completed the erection of a new Independent telephone system in Dayton, under the corporate name of "The Dayton Home Telephone Company." The list of the other officers and directors is as follows: D. J. Hauss, secretary and treasurer; Province M. Pogue, general counsel, and R. C. Gifford, engineer. Mr. Hauss, with the former company, was vice-president and general manager, which position is now filled by the representative of the Eastern capitalists.



The Operating Field

TELEPHONE BUSINESS AS AN INVESTMENT.

THE American public has been led into telephone projects as an investor through numerous channels, good, bad, and indifferent; that portion going in through the first mentioned channel have every reason to be satisfied, and it can be said without fear of contradiction that this class is largely in the majority. The two latter classes are beginning to appreciate their errors of omission rather than commission, and it is the purpose of the writer to show how such errors can and will be avoided, says *Finance.*

In the early days of Independent telephony the investor was born of monopoly and poor service; a sterile parentage made fertile by the American spirit of fair treatment and a proper return for value given, and the force of this spirit is attested by 3,000,000 Independent telephones as an offset to 1,250,000 Bell instruments in service; the greater portion of this Bell installation existing because of political influence and undeveloped Independent territory, coupled with the long distance service which the old line company has had established for years. That this condition also is being rapidly met is evidenced by the complete network of long-distance lines in operation in the Central West and Middle Atlantic States.

When the pioneers began the construction of Independent plants they were too suspicious to use Bell employees. Bell employees were afraid of the ridicule said at the time to attach to foolish undertakings; the result, the poorest possible construction, worse even than that of the old companies, with service equally as bad, but at a greatly reduced price. Later came the putative Independent telephone engineer and with him an extravagance and utter lack of experience which was largely responsible for the few failures we know of. And be it remembered, we hear very little of the success and very much of the failures, both Independent and Bell.

At the present time we have in the Independent field some of the ablest men in the profession, commanding the highest salaries paid, and who are responsible for some of the most astonishing results. To-day methods far in advance of those formerly employed are in use whereby the investor is assured of a return before a franchise is asked for, and this, too, without the aid of that financial vampire, the promoter. Good, hard ability, conjointly with proper economy, is accomplishing what sentiment, inexperience and extravagance made worse than failure. One failure has injured the Independent situation more than the hundreds of successes have done good for it.

The fact that operating telephone men in the Independent field receive such large salaries goes far to prove the value of telephone investments. From time to time the theory is advanced that the telephone business is a "natural" monopoly, being supported by its "natural" adherents, with arguments as poor as their methods, for the sole purpose of discouraging and destroying legitimate competition; why, let us ask, and we know beforehand we cannot be given an honest answer, is it more of a "natural" monopoly than the whitewash brush, the hoe, or the shovel? The average American knows the answer when the question is asked and we dare not insult his intelligence.

To the telephone operator the failure of a telephone proposition is unknown when the proper methods are employed—success is established when work is begun upon the proper lines. Estimates are based on the conditions found, and their accuracy is as well established as in any of the other engineering branches; hence, the investor has nothing problematical to deal with. We leave to honestly and impartially prepared statistics the facts as to the Independent operating companies on a paying basis. The investor can have for the asking the benefit of the experience of numerous capable, honest and intelligent operating men, as to the construction and operation of telephone properties.

FORT WORTH'S NEW SYSTEM.

WORK on the Fort Worth, Texas, installation is progressing smoothly. The delivery of material is slow and this is holding back the work some, but on the whole the progress is satisfactory. All the underground cables are laid and the aerial cables are installed. The work of splicing is now being carried on. The company is building a new pole line to Glenwood, and also one to North Fort Worth, at which point there will be a branch exchange with trunk lines connecting the North Fort Worth system with that of Fort Worth.

The company says that it is its intention to have the system in operation by about the 1st to 15th of November. Work is progressing well on the plants at Gainesville and Denton. The underground systems in both of the cities named are being completed. This work will be followed by the building of toll lines connecting with the United States Independent Company at the Territory border.

The United States Company is building a line out of Kansas City to the Southwest, touching all important Territory and Kansas points. It is building to Topeka, Kan., from which point it will extend southwest to Wichita, Kan., thence to Oklahoma City and Guthrie, O. T. From the latter point it will be built to the boundary line between the Territory and Texas, and thence to a point near Gainesville, a distance of forty miles. At this point the Fort Worth Company will connect with the line. The Home company will, in addition to this, connect with other Independent lines in Texas and complete a telephone system that will reach most of the principal cities and towns in the State, and also many of the larger cities in the territories and in Kansas and Missouri.

The United States Company is constructing its main line through a country about midway between the Rock Island and Santa Fé railroad systems through Kansas and Oklahoma, and laterals will be built out to reach many of the larger towns en route, extending from Kansas City to the Texas border.

U. S. TELEPHONE ENTERS CINCINNATI.

INDEPENDENT telephone companies are about to win another victory and gain admittance to Cincinnati, the only city left in Ohio without Independent telephone connection. The United States Telephone Company is now practically operating in Cincinnati, despite the efforts of the Bell Telephone Company and its subsidiary, the City and Suburban Telegraph Association, to keep out their rival. The instruments of the United States Telephone Company are located in a drug store just inside the corporation line of Cincinnati.

Plans have already been made for connecting the Fitzsimmons system with Independent lines at Cincinnati, but this will not be the only place of entrance to the city. The line from Hildreth's drug store runs to New Baltimore, O., thence to Venice and Harrison, and from Venice connects with the Home Telephone Company in Hamilton. O. Here the connection is made with the regular United States system, which reaches Columbus, Cleveland and other parts of Ohio and adjoining states.

The U. S. Company is also coming into Cincinnati by way of Linwood, the lines from Portsmouth, O., having been extended to Milford, from where connection is made to Loveland and Hamilton. Thus Cincinnati is surrounded by these lines, ready to put in at any point where an opening may be found. It is understood that the company also has a private right of way to the heart of the city over the right of way of the Miami & Erie Canal Transportation Co. An operating company will be formed to lease the Fitzsimmons lines on a basis similar to the leasing method of the street railway system by the Cincinnati Traction Company.

TOLEDO HOME CO. RAISES RATES.

AN advance in telephone rental, to $6 per year for residence service and $8 per year for business service, has been made by the Home Telephone Company, of Toledo, Ohio. This new schedule of rates applies to newly installed instruments and not to those now in use. Present subscribers will not be disturbed, as they hold contracts running all the way from one to three years.

The old price for residence service was $26 per year, with a $2 discount for cash subscribers, making the actual annual rental $24. Now, a price of $32 gross, or $30 net, is asked—the monthly rental being $2.50 per month instead of $2. For business telephones the new price is $52 gross, or $48 net. The old price was $40.

An officer of the company gave the following reason for the increase: Having expended $100,000 in enlargements during the past few months, we felt compelled to extract a more reasonable price for our service. We have over 7,000 telephones and no city in the country of relative size and with as many telephones charges rates as low as the Toledo company.

The growth of this exchange has been phenomenal. It started expecteing to have 3,000 instruments, and probably 5,000 a few years later. The plant was in operation a year on August 10th, and has over 7,000 telephones in operation. The number of people on the waiting list is 200 and the company says it cannot afford to give them the use of the 7,000 line board at the same price charged when it began business on the basis of 3,000 lines.

SUCCESS OF INDEPENDENT TELEPHONY AT FORT WILLIAM, ONT.

THE complete success of the Independent telephone exchange at Fort William, Ont., the rapidly increasing numbers of subscribers, and the unqualified support given it by the people in the face of the most adverse and unfavorable outside circumstances, clearly demonstrate the great advantages and benefits of Independent telephony. The plant, which was established by the municipality about a year ago in opposition to the old company, was completely destroyed on March 10th by the burning of the town hall, in which was located the central office equipment. Immediately after the exchange had been destroyed, and it was known that it would be absolutely impossible to give any service whatever for a time, the old company (Canadian Bell) used every effort possible, first to induce the subscribers of the new system to allow the installing of their service, and when it was evidenced that the subscribers could not be secured even at this advantage, they endeavored to induce the officials to dispose of the lines, offering to take the property at a good figure and to make practically any concessions asked.

Notwithstanding the most attractive offers from the old company, and the fact of not being able to make any connection with railroad companies on account of the existing anti-public Bell-Railway compact, it was decided unanimously to re-equip the plant at the earliest date possible. At a meeting of the councillors and committee, the Mayor was authorized to proceed with the work. A telegram was at once sent the International Telephone Mfg. Co., Chicago, the manufacturers of the equipment first installed, to duplicate the original order for central office apparatus at the earliest date possible, on account of fire, and a contract was let for a new building, it having been decided to use a special exchange building. The building, which was absolutely fireproof, was finished, the equipment installed, and the plant put in complete operation in about sixty days from the time the first plant was put out of service.—*Canadian Engineer.*

FRANCHISE TAKEN FROM CUMBERLAND.

FAILURE to give first-class service and to install an up-to-date equipment has caused the Shelbyville, Ky., City Council to revoke the franchise of the Cumberland Telephone and Telegraph Company. The following resolutions were passed by the council: It is the sense of the Board of Council that the Cumberland Telephone and Telegraph Co. has not complied with its contract contained in the ordinance under which it purchased a franchise to operate a telephone system in the city of Shelbyville, in that it has failed to construct, establish or maintain the best modern improved type of telephone system as required by said contract.

The ordinance ordering the sale of a franchise for another telephone system in Shelbyville was taken up and passed by a unanimous vote. The ordinance requires the purchaser to begin installing the new exchange within sixty days after the purchase of the franchise. The ordinance also specifies that the central energy system shall be installed.

FORTY THOUSAND FOR THE LOSS OF A HAND.

NATHAN HORNING, a fireman, of Johnstown, N. Y., has commenced suit against the Hudson River Telephone Company to recover $40,000. He was working at a fire when he became so badly entangled with a supposedly dead wire and was so badly burned that he will probably lose the use of his left hand. He charges that his injury was caused by the negligence of the Telephone Company in failing to guard its wires where they cross the wires of the Fulton County Gas & Electric Company.

SUBSCRIBER SUES FOR THE USE OF "NUMBER 5,000."

SUIT has been started by the partnership of Thoman & Stump, of Columbus, Ohio, to obtain an injunction restraining D. D. Tresenrider and the Citizens' Telephone Company from taking from complainants their telephone number "5,000." Complainants allege that they bought out the defendant Tresenrider's grocery and with it the right to use "No. 5,000" as their telephone number, but that the telephone company will not give them that number, saying that Mr. Tresenrider claims it. The company offers the new firm the number 5,039, but they claim that the loss of the old number will injure their business.

WHAT GOOD MANAGEMENT WILL DO.

AN example of what good management can do for a company is what has been done for the Cuyahoga Telephone Company, of Cleveland, Ohio. Mr. F. D. L. Turner is general manager of the company. During the six months of his administration most wonderful results have been accomplished. The affairs of the company have been brought into such shape as to enable it to be operated at an average of 47 per cent. for the first six months of the year. The increased income of the company in the same length of time was $22,000.

TELEPHONE SYSTEM FOR IRRIGATORS.

PLANS were completed recently at the Denver, Colo., headquarters of the United States government hydrographic survey for an 80-mile telephone line between Phœnix, Ariz., and Tonto, where will be constructed the great reservoir that it is expected will save extensive agricultural interests in the Salt River valley.

The Editor's Page.

THE PUBLIC DEMANDS COMPETITION.

IN a recent interview president B. G. Hubbell, of the Consolidated Telephone Co., of Buffalo, N. Y., gave the following statements bearing on telephone competition which we feel are of more than passing interest and as they may be of value to operators we take the liberty of giving them, As an illustration of the demands of the public for competition furnished by Independent telephone companies, he cites conditions at Toledo, O., where some several years ago an Independent telephone plant was built, but was soon after bought by the Bell company. In order thoroughly to disgust the telephone-talking public of Toledo with a competing telephone system, the Bell company allowed this Independent plant to deteriorate rapidly, and gave the very poorest service that it possibly could and still keep the plant in operation. The Toledo public became thoroughly disgusted with the service given by this competing company and were forced from necessity to transfer its business to the Bell. As soon as the service got so poor and the subscribers so few as to make it practically useless, the Bell company publicly announced that out of regard to the public interests it had bought the Independent plant and would dismantle it.

After this most unsatisfactory experience with competition, and after being relieved therefrom, the public demand for competition became so great that a new Independent telephone company was formed, the securities of which were subscribed to the amount of nearly $1,000,000 by Toledo interests and this new plant has now in operation in competition with the old Bell system over 7,000 telephones in the city of Toledo; more than double the number of subscribers that the Bell company has in that same city. This is conclusive evidence that the public demands competition in telephone interests as well as in other lines of trade. Monopoly never atttains the same degree of perfection in quality of service, nor in extension of trade, as will naturally be developed by competition.

"The argument is sometimes raised that competing telephone companies necessitate the leasing of two telephones, where one instrument would have been sufficient without competition. In answer to that I cite the condition of telephone competition at Cleveland, O.

Recent statistics as to telephone service, compiled by the city authorities of Cleveland, show that previous to the starting of a competing telephone company, the Bell Telephone Company had less than 5,000 telephones in the city of Cleveland. At the time this report was made the Bell company had 14,000 telephones and the Independent company 10,000 telephones, making a total of 24,000, as compared with 5,000 previous to competition, and the remarkable thing about the report is that less than 3,000 of the 24,000 subscribers had two telephones. There were, therefore, not less than 21,000 people having telephone service with but one telephone to pay for, as against 5,000 previous to competition. The 3,000 people who had two telephones required an extra telephone in their business, owing to the increased uses of the service from the largely increased numbers of subscribers that could reach them. Previous to competition a long-distance telephone in Cleveland cost $125 a year, with less than 5,000 people to talk with. To-day, through competition, two telephones can be rented for less than the price of one telephone before competition, and with over 21,000 people to talk with.

THE DISAPPEARANCE OF THE TELEGRAPHONE.

THOSE who were interested in the Poulsen Telegraphone have wondered why it was that suddenly the invention disappeared from the public view. It was certainly a very interesting application of the telephonic principles, which were so peculiarly applied in its construction We have lately come into possession of the following information from an entirely reliable source which will, undoubtedly, be of interest to such.

Poulsen's inventions were all patented in the United States; and very broad and basic claims granted nearly two years ago. A short time after the issue of the patent it was discovered that by the negligence of a clerk in the patent attorney's office, the application had been filed seven days too late, and that litigation would most likely ensue. To avoid this, it was necessary to obtain a validation Act from Congress; and it was thought wise to withdraw the invention from public examination and discussion until a full measure of relief was obtained. A bill was introduced in the House, and, after a thorough investigation, was passed unanimously and became a law on the 19th of February, last. Meanwhile the Danish inventors busied themselves with the improvement of the instruments. From a wire wound cylinder—cumbersome in size and operation—they have advanced to a thin steel disc, capable of receiving from 500 to 800 words, which is so light that it can be mailed for a single rate of postage, and capable of being used on any similar machine. It is predicted, by those who know, that the invention, in its improved form, will, shortly, again be before us.

A RATHER NOTABLE CONTRAST.

IT will be remembered, that in a previous issue, we told how in Los Angeles, Cal., patrons of the Sunset (Bell) Telephone Company, after patiently enduring for a time an impossible service took the telephones from their positions in the buildings and deposited them on the sidewalks. It will also be remembered that one particularly displeased subscriber placed a sign over his rejected instrument on which were the words: "Discarded Because It Was Rotten. Call Us Over The Home Telephone." These people were glad to get rid of their telephones. In striking contrast to this there comes the story of another incident which recently occurred in Los Angeles. A physician threatened to sue the Home Telephone Company unless it installed his instrument in twenty-four hours. He dropped the following note to the company:

Gentlemen:

I hereby notify you in writing that if you don't give me telephone service in 24 hours I will institute legal proceedings against you. *Respectfully,*

S. B. Lyon, M. D.

The telephone was in service before the impatient physician's letter was received by the company so it was not necessary to take the matter into the courts. On the one hand, the disgusted subscriber threw his telephone out in the street and went to the trouble to get a sign lettered which would give his opinion of the service he had been enduring. On the other, a busy physician thinks another service so desirable that he threatens to sue unless his instrument is put in immediately.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

COMPANY NOT LIABLE FOR EMPLOYEE'S UNAUTHORIZED ASSAULT.

THE foreman of our construction gang became involved in a dispute with a farmer past whose property we were constructing a telephone line and assaulted him. Is our company liable to the farmer for damages, the dispute having arisen because the farmer objected to our building the line along his premises? F. D. M.

YOUR company is not liable in damages for the assault committed by your servant. The rule of damages in cases of intentional wrongs such as this is that the master is liable for the wrongful acts of his servant when the scope of his employment is such that he has been left at liberty to do, while attempting to discharge it, the injurious act complained of. The liability for such an intentional wrong can only arise, however, when that which is done is within the real or apparent scope of the master's business. It does not arise where the servant has stepped aside from his employment to commit a wrong which the master neither directed in fact, nor could be supposed, from the nature of his employment to have authorized or expected the servant to do. In the case stated, the company did not direct the assault; nor is the employment of a foreman of a construction gang such that the company can be supposed to have authorized its employee to assault persons with whom he happened to come in contact. The fact that the dispute arose because the farmer objected to the company building along his premises would not alter the case unless it appeared that the assault was actually committed to enable or aid the company to erect the line in defiance of the farmer's objections.

SUIT FOR A LOST LIFE.

THE Brush-Swan Electric Light Company, of Ithaca, N. Y., now the Ithaca Electric Light Company, is being sued by John McMahon, administrator of the Estate of Thomas P. McMahon, his son, now deceased. Young McMahon was in the employ of the New York and Pennsylvania Telephone Company. On July 8th he was working on a telephone pole, the wires of which crossed the heavily charged wires of the Electric Light Company nearby. The telephone wires upon which the boy was working were in themselves perfectly harmless. One of them came in contact with a high tension electric light wire at a point where the insulation had been burned away. A current of a voltage of 2,000 was carried by the telephone wire and by it was sent through the body of the boy, who died before assistance could reach him. The negligence charged upon the part of the Electric Company is that the wire was overcharged and not properly insulated. Strangely enough the Telephone Company escaped being made a joint defendant.

EAVESDROPPED OVER THE TELEPHONE.

D. S. FARMER, treasurer of the Lunday & Zion Telephone Company, of West Macon County, Ill., has sued B. F. Jenkins, a stockholder, for $7,500 damages for an alleged slanderous message sent over the wires. The plaintiff expects to make his case upon the testimony of eavesdroppers, who held their receivers down to hear the message, a custom common on country lines. The language on which recovery is sought is as follows: "You have squandered three or four hundred dollars of the company's money and I will make you account for it at the next meeting or I will go after your bondsmen." Without the eavesdroppers, plaintiff would have no cause of action, because language to be slanderous must be in the hearing of a third person. Under the laws of slander, the offensive language must also be used "in the presence of others." In this case it can only be charged that it was "in the hearing of others," as those who heard it were admittedly not present. The plaintiff's lawyers contend, however, that the effect was the same.

NEBRASKA TELEPHONE COMPANY WINS.

THE District Court at Fremont, Neb., has decided the case of the Nebraska Telephone Company v. the city of Fremont in favor of the plaintiff, making the temporary injunction already granted perpetual. The case grows out of the attempt of the city council to prevent the Nebraska Telephone Company from extending or repairing its lines on the theory that it has no franchise to do business within the city. Acting under instructions of the council, the street commissioner cut some of the company's poles and wires, and the injunction followed. The Nebraska Company claimed it had the right to do business under an old ordinance, granting to W. J. Biggar and others a franchise to install a telephone plant. The case was hotly contested in the district court and will undoubtedly be appealed to the supreme court.

ENJOINED FROM RAISING RATES.

SUIT for a mandatory injunction has been started against the Columbiana County Telephone Co., of Salem, O., by Farmer & Getz, a business firm of that city, and the city itself. The petition asks that the company be required to observe the terms of its franchise with the city and furnish all persons with service at the rates fixed therein. The complainant alleges that the ordinance, which the company accepted and therefore gave the force of a contract, fixes the maximum price of business telephones at $24; that they offered $6, a quarterly installment in advance and asked that an instrument be placed in their place of business; but that the company declined to accept the tender and refused to put a telephone in complainant's store unless he paid $9 per quarter.

CONDEMNATION PROCEEDINGS.

THE Inter-Ocean Telephone Company, at Bolivar, N. Y., has commenced proceedings to condemn such part of the farm of Floyd Kenyon as it needs to set its poles on, in order to make connections with Olean. It is said the Bell Company has paid Kenyon $750 for the exclusive right of way across his land in order to keep the Inter-Ocean Company out of Olean.

HAD TO PAY FOR HIS TELEPHONE.

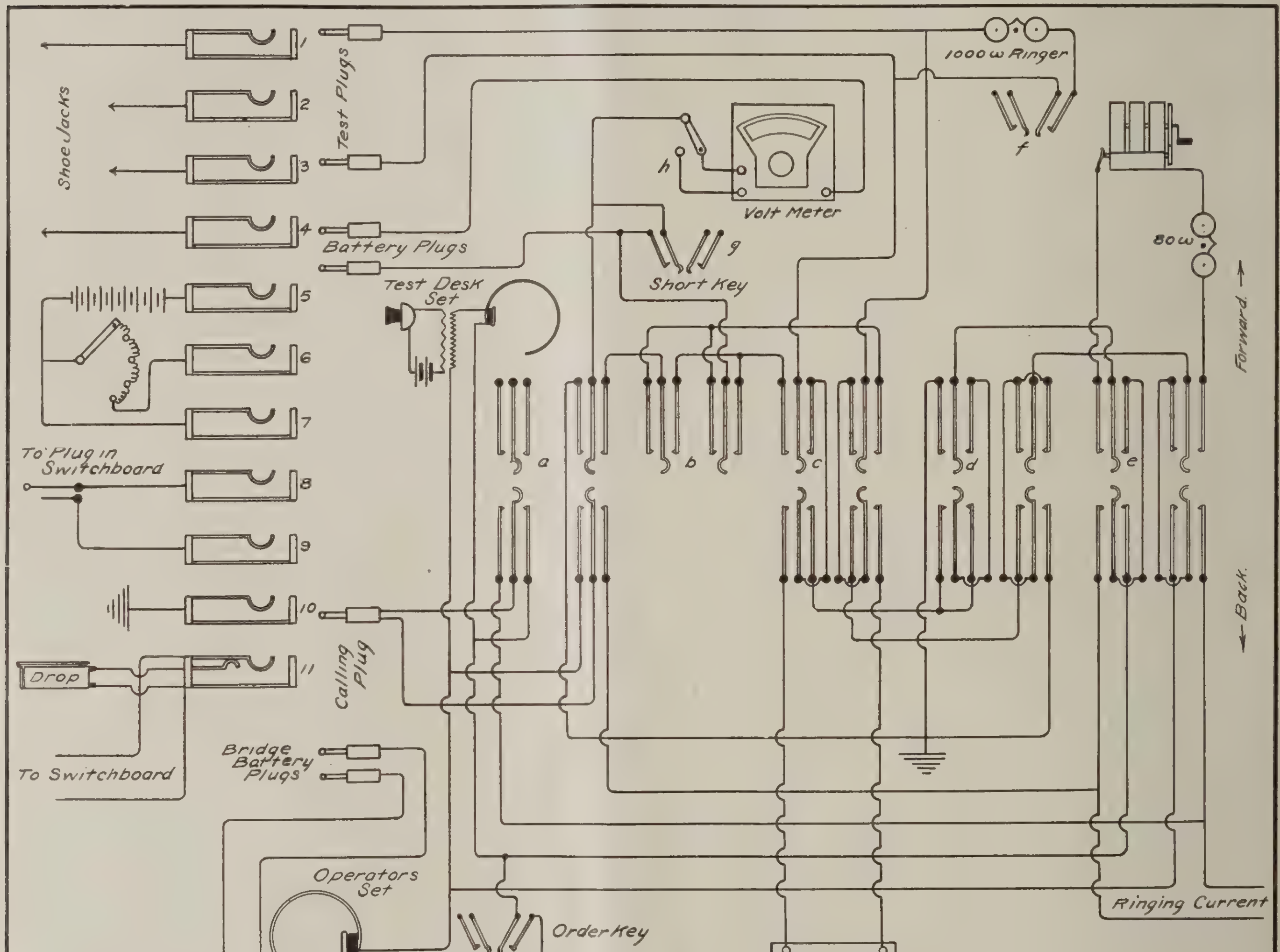
THE City Court, of Elmira, N. Y., has decided that James B. Hague, a blacksmith whom the company sued for a telephone bill, must pay for his telephone. Hague resisted payment on the ground that the instrument did not give satisfaction.

TEST DESK CIRCUITS FOR A MAGNETO SYSTEM

By C. H. Coar.

It is well known that one of the most neglected features of the medium sized exchanges throughout the country is the testing apparatus. It is hoped that the suggestions contained herein will be of value to wire-chiefs so situated.

The jacks, *1* to *11*, may be mounted in any location to suit the position of the set. The jacks *1* and *4* should go to the line side of a shoe or plug adapted to fit in the arrester springs in the terminal rack; while jacks *2* and *3* should connect with the switchboard side from the same place, thus giving the wire chief power to test a circuit from the terminal rack towards the switchboard or towards the line. The battery jacks *5*, *6* and *7*, give three ranges of battery strength, 10, 15 or 25 volts in this case. A small German silver rheostat may be cut in series with the terminal to *6* jack to regulate voltage. The test jacks *8* and *9* should connect with a cord and plug located in a position at the switchboard where the operator handling it can reach all lines.

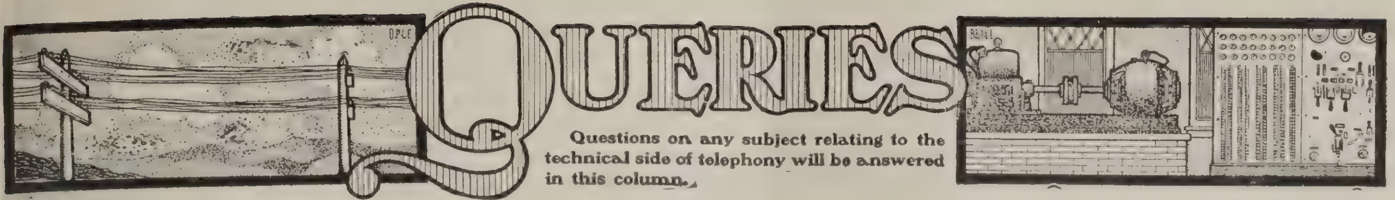


The ground jack *10*, is used in testing a line for ground, this being the local ground. Jack *11* is connected with a drop to be located near the test set so that it will be handy for inspectors to call up for a test.

It is necessary to have scale readings of the voltmeter taken through standard resistances with the different ranges of battery power you use in the voltmeter circuit. Should you wish to read the voltage of your battery on a short circuit you can do so by pressing key *g*; the two different scales in the voltmeter are controlled by the switch *h*. To test a line through the switchboard, proceed as follows: Order the line to be tested plugged into with the test plug giving the direction over the order wire. To test for a "loop cross" throw *a* and *c* keys forward. To test for a ground on one side of the line throw *c* key forward and on the opposite side of the line throw *b* and *c* keys forward. To test for a cross between two circuits, have the operator put one of them on the test plug; the other one can be put on at the terminal rack, thus enabling you to test them towards the board and line also.

These same tests may be made with the series hand generator; to test for "cross" or "open" throw *e* key forward. To test for a ground on one side throw *e* and *d* keys forward; on the opposite side *e* forward and *d* key back. To use the Wheatstone Bridge on the test plugs throw *c* key back; the bridge battery plugs may be plugged with any of the three battery voltages, and then you can test for ground or cross by changing your test plugs to ground.

By having a short cord with a plug at each end, you can ground one side of the battery and then it is possible to use the bridge for a Varley Loop test. There are several other tests that can be made with the apparatus, such as reading the strength of a foreign current by plugging voltmeter plugs in test jacks. A 1,000-ohm ringer is bridged across the test plugs with a key *f* in series, and by pressing this you may have a subscriber ring you in case it is wished to try his magneto, or to receive a ring on an 80-ohm ringer you can throw *e* key forward.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

INTERCOMMUNICATING CROSS TALKS.—(190.)

An intercommunicating plug board system of 12 telephones, wired with regulation rubber covered telephone cable, shows a great amount of cross talk when more than one pair of telephones are in use. Some of the instruments when in circuit show more cross talk than others. Each telephone has its own battery, generator and call bells. The cable is of twisted pair which gives ample transposition. The batteries are not all connected alike, that is on one telephone the positive wire may run to one side of the talking circuit and on another instrument the negative pole may be connected to that side. The battery sets being separate and distinct should have no inductive effect on the system in general. The wiring installation is new. Each telephone having a certain number connects to a wire of the same number. That is: Telephone No. 1 connects to wire No. 1 and thusly throughout the system. For the 12 telephones there are 13 wires. Fig. 190a shows the arrangement.
H. D. B.

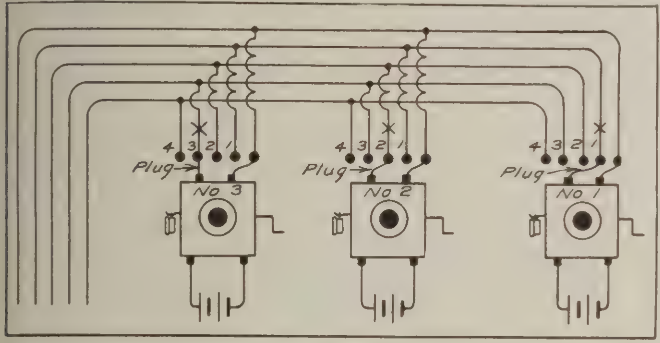


Fig. 190a.

We do not think that the arrangement of the batteries could have much influence on the operation of the system one way or the other. It may be that you have one wire from one telephone and another wire from another telephone twisted together in the twisted pair cable of which you speak. We do not see how this could be avoided if you use twisted pair cable. This may be the cause of the crosstalk.

It is probable that the crosstalk comes from the use of the common return wire. Fig. 190b shows conditions when two stations are engaged in conversation. If an induction coil is used the batteries are not in series with the line, as indicated, but this does not effect the explanation. The heavy line represents the return wire. Suppose one of the stations talks. A current of varying strength will flow through stations and through the common return. This flow of current will cause the points *A* and *B* on the common return to have different potentials, that is, a current would flow through any conductor, such as the dotted one shown, which is connected between *A* and *B*. If the dotted wire had 100 times more resistance than the heavy wire, 100 times more current would flow through the large wire than through the small one but, nevertheless, a current would flow through the small wire and if a telephone receiver were cut in at the point *R* and 1/1,000,000 of an ampere flowed through it there would be a noise in the receiver. Fig. 190c shows diagramatically, conditions when 4 stations on your system are engaged in conversation. One pair of stations talking will vary the potential of the points A and B and this variation of potential will cause some current to flow through the other stations as they are connected in shunt around the common return *A B*. If the common return had practically no resistance and the two stations in series had a very great resistance, so little current would flow through the telephone receivers that they would not be affected. Obviously we must confine all the current possible to the common return by reducing its resistance. This could be done by connecting in parallel with it another wire. It would be hard to advise without experimenting just how large a wire should be used. Be sure that all the taps connecting the instruments to the common return are well soldered. A case is on record where cross talk was put on an entire switchboard merely because some soldered connections were made with acid instead of resin. When the connections were resoldered with rosin the cross talk disappeared. The same result may be accomplished by increasing the impedance of the instrument circuits as by decreasing the resistance of the common return. This may be done by inserting retardation coils as shown in Fig. 190c in the talking circuit. The transmission will be decreased by doing this but the gain in freedom from cross talk will more than compensate. In your case a retardation coil should be inserted in each instrument circuit as indicated by × in Fig. 190a. You may be able to use the secondaries of old induction coils or coils from a large electric bell for the purpose. If you do not get sufficient retardation from the simple coil, try enclosing it in an iron envelope of pipe or speaking tube.

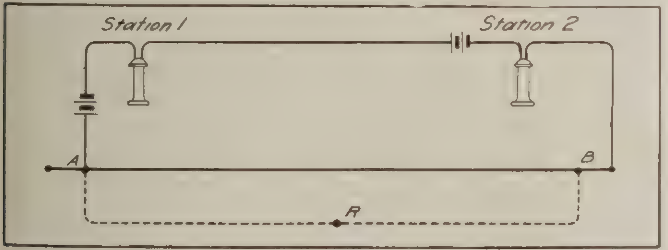


Fig. 190b.

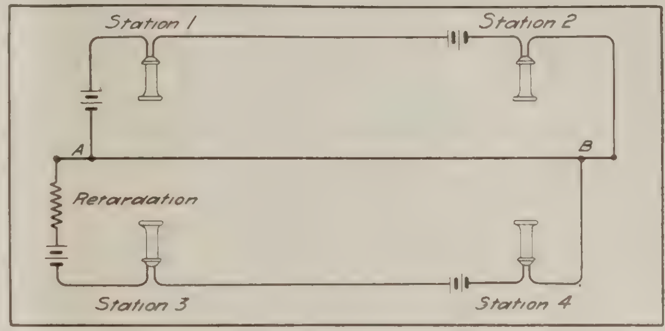


Fig. 190c.

THE SYMBOL FOR A BATTERY.—(191.)

Will you please inform me which is the right representation of the positive side of the battery, the short thick line or the long thin one?
U. T. C.

The long thin line is almost universally used to represent the positive side of a battery or the side from which the current flows. Fig. 191 shows this.

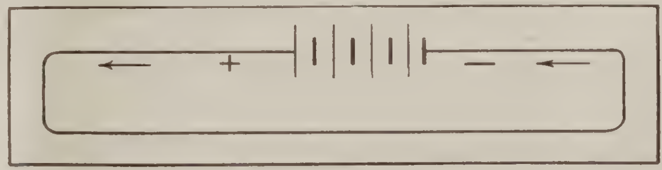


Fig. 191.

FOR CLEANING POWER BOARD PANELS.—(192.)

Can you give me a receipt for a solution that will take the dirt from the marble panels of our power board?
W. I. D.

It depends altogether on what the dirt is. Soap and water will be found as efficient as anything in many cases. If this does not cut the dirt try alcohol or ether.

PATENTS ISSUED

SELECTIVE PARTY LINES.

Sylvanus A. Reed, of New York, patents (No. 737870 and No. 737869) a system for selective telephone party lines. Both of these patents are for the same subject. No. 737870 particularly covers the circuit, while No. 737869 is particularly to protect the signaling device. These patents are an extension of an elaboration of patents by the same inventor of No. 688118, granted last December, and described in our issues of that time. The essential details of these inventions are shown in Fig. 4. The inventor proposes to arrange the various sub-stations on the plan of a Wheatstone bridge, and then arrange the signaling mechanism at the office, so that it may send signaling either of different polarity or of different voltage. Under such circumstances, by the theory of the Wheatstone Bridge, the various sub-stations could be made selective. In Fig. 4, *H* is the common battery at the exchange provided with a reversing switch *P*. Upon this battery are a series of resistances, *p*, *d*, *c*, *b*, and *a*. By means of the key *K'*, a number of contacts are provided, each one of which increases a different resistance around the battery. Thus, by the combination of the switch *P* and the key *K'*, signaling current of different voltages and different polarity may, at the pleasure of the operator, be sent into the line. Each sub-station is provided with a signal receiving apparatus that is shown in Fig. 5, and is the object of patent No. 737869. It essentially consists of a mechanism that operates precisely like a D'Arsonval galvanometer. Thus signaling is arranged to close the circuits of the bell at the sub-station. To call any party, the operator sends over the line the current of proper polarity and voltage, thus closing the bell contacts of the subscriber she wishes to get, leaving the corresponding bell contacts of all other subscribers open. The operator then rings the sounding bell of the desired subscriber.

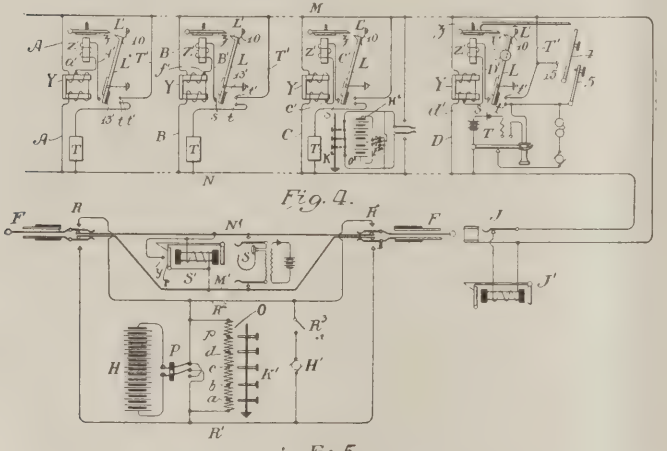
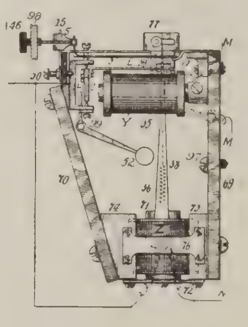
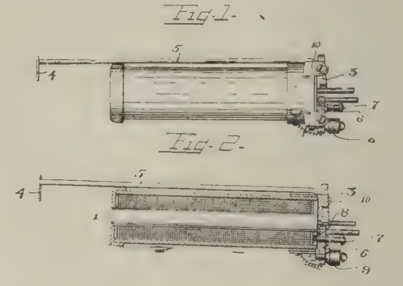


Fig.5.



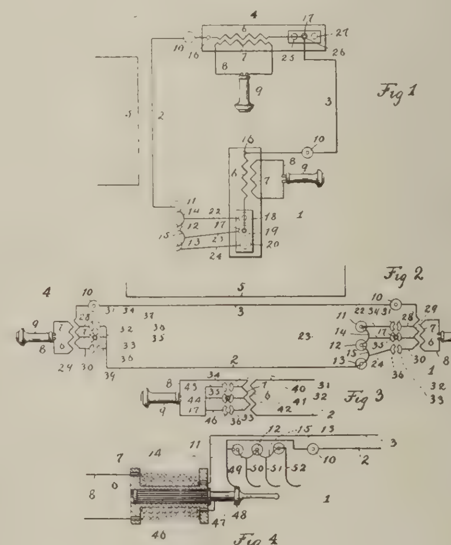
TELEPHONE SIGNALING APPARATUS.

William M. Davis, of Chicago, patents (No. 737715) and assigns to the Stromberg-Carlson Telephone Manufacturing Company an improved telephone signal. The object of this invention is to provide a telephone signal which will be more sensitive than that which is now used in switchboards. It is shown in Figs. 1 and 2, Fig. 1 being an elevation, and Fig. 2 a section. There is a core *1*, which is wound with wire after the fashion of the ordinary drop. This is provided, as usual, with an armature *3* that carries a long arm *5*, on the end of which is a signal of shutter *4*. In addition, the invention provides a supplementary armature *6* that carries no signal, but is suspended in the most delicate manner. This shutter controls a local circuit; in case the signaling current is too weak to operate the main armature *3*, the supplementary armature *6* will close the local circuit and thus actuate the main armature.



A DEVICE TO PREVENT INDUCTION.

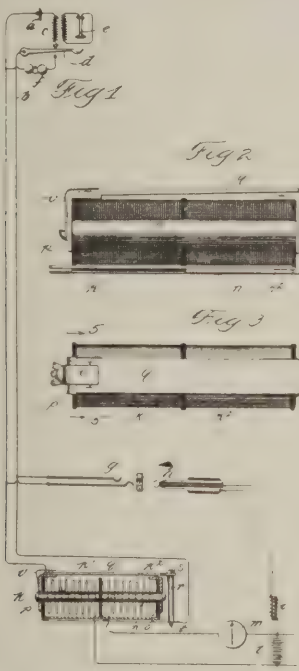
William Condon and Albert Barrett, of Kansas City, patent (No. 737710 and No. 737711) a method for preventing induction on telephone lines. Both of these patents are for the same device, one covering the circuit and the other covering the apparatus. This device is shown in Fig. 1. The inventors describe



three methods. They have arranged an induction coil so that the two windings of the coil are movable, one with respect to the other. They then propose to remove one winding so far from the other that the line becomes noiseless from disturbances, and thus to increase the power of the transmitter sufficiently so that the conversation may be readily understood. They also propose to make the induction coil in several parts, and cut out one or more sections until the same result is achieved. Lastly, they propose to provide an iron core in the induction coil that is movable, and adjust this core in and out of the coil until the same result is achieved.

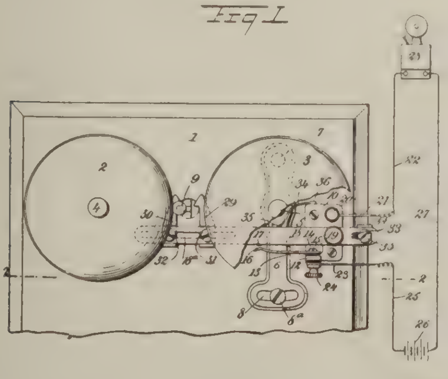
TELEPHONE SIGNALING APPARATUS.

William M. Davis, of Chicago, patents (No. 737589) and assigns to the Strömberg-Carlson Telephone Mfg. Co., an improved telephone signal. This invention has for its object an improvement in telephone line signals. It is shown in Figs. 1, 2, and 3, and Fig. 2 is the section of the signal. It is a differentially wound electro magnet, having an armature arranged so as to form very nearly a closed magneto circuit with the p^2. When the magnet is excited, the armature is attracted outwards and opens the contact between the spring under the platinum point *o*. The inventor further describes the use of this differentially wound signal, as shown in the circuit of Fig. 1. When the subscriber removes the receiver, the line signal *m* is actuated because the relay *k* is differentially wound, but when the plug *p* is inserted in the jack *g* one of the differential windings is short circuited The other parts opening to contact at *o* restore the line signal.



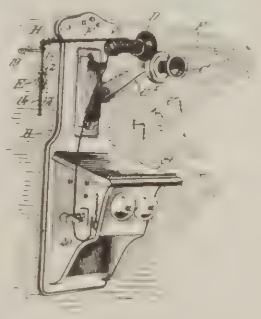
ATTACHMENT FOR EXTENSION BELL.

Geo. L. Gulliford, of Bloomington, Ill., patents (No. 737922) and assigns one-half to C. S. Davison, an improvement to operate extension signals in subscribers' sub-stations. The object of this invention is to provide a method whereby an extension bell may be readily attached to the sub-station, and may, or may not be operated at the pleasure of the subscriber. This invention is shown in Fig. 1. Upon the ordinary ringer a lever *18* is attached. This lever carries two small dogs *9*, which normally engage with the bell clappers. Upon this lever there is a contact *17*, a spring *16*, that enclose an extension bell *28* and local battery *26*. The dog *9* is attached upon the bell clapper and supports the lever out of contact with spring *16*. When the bell rings, the clapper is disengaged from the lever, which drops the contact *17* and rings the extension bell.



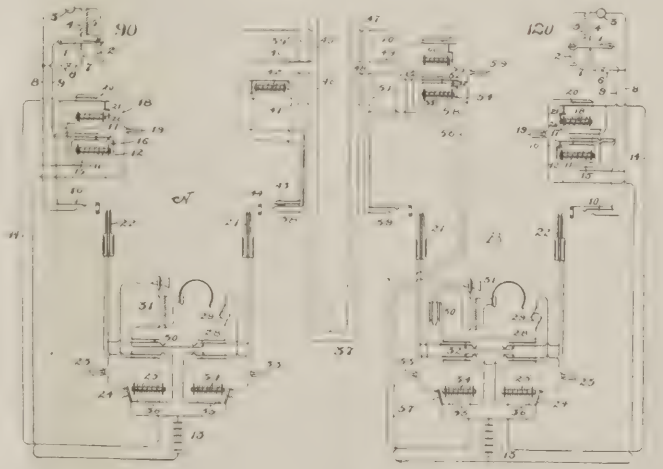
A SUPPORT FOR TELEPHONE RECEIVERS.

Ephraim Bass, of New York, patents (No. 737894) an improved support for telephone receivers. This device is shown in Fig. 1. It consists of a wire bracket which may be secured to the wall adjacent to the telephone. In the end of this support a wire cradle is formed on which the receiver lies. Fig. 1 is explanatory of this device.



TRUNK LINE CIRCUIT FOR TELEPHONE EXCHANGES.

William M. Davis, of Chicago, patents (No. 737590) and assigns to the Stromberg-Carlson Telephone Manufacturing Co., an improvement for trunk line circuits. The object of this invention is to provide an improved trunk line circuit between telephone exchanges, so that signaling will be rendered more certain, and so that repeating coils may be used to better advantage for making such circuits noiseless. The complete circuit is shown in Fig. 1, in which *90* is one subscriber's line terminating in an exchange in which the cord circuit is represented by *A*, and *120* is the other subscriber's sub-station, terminating in a cord circuit, and is represented by *B*, while *37* is the trunk line circuit extending between the two exchanges. The sub-station circuits and the exchange circuits are those of the well-known Stromberg-Carlson type, so that the novel features of the invention are embraced in the circuit shown at *37*, the operation of which is rendered sufficiently clear by the drawing, so that the detailed description of the method of operation is superfluous.



The Week's Messages.

FINANCIAL

GRAND RAPIDS, MICH.—The A. C. Himebaugh Telephone company has changed its name to the Southern Michigan Telephone company and increased its capital from $5,000 to $60,000.

GLOVERSVILLE, N. Y.—A meeting of the stockholders of the Glen Telephone company will be held at Johnstown, September 15, for the purpose of voting on a proposition to increase the capital stock of the company from $100,000 to $300,000.

FRANCHISES

LAWRENCEVILLE, IND.—The Farmers' Home Mutual Telephone Company of Lawrence County has been unanimously granted a franchise here by the City Conncil.

ABINGTON, MASS.—The selectmen at their monthly meeting, granted a franchise to the Old Colony Automatic Telephone Co.

COMBINATIONS

AUGUSTA, ILL.—The rural telephone lines running into Augusta have been combined with the Augusta Mutual Telephone Company into an exchange.

FERTILE, MINN.—C. O. Wheeler has sold the Fertile Telephone Exchange to the Fertile Brickyard company for $5,000. This is the fifth system Mr. Wheeler has installed and sold.

PERSONAL

C. H. BROWN, president of the Mt. Pleasant Telephone company and promoter of the new automatic company in Burlington, Ia., is interesting Burlington capital in the Burlington proposition.

TEHODORE GARY, of Macon, Mo., president of the Macon and Jasper County Telephone exchanges, has applied for a copyright on a device calculated to answer the requirements of the postal department for a cheap and easy method for making small remittances by mail. Mr. Gary's scheme is a card about the size of a postal card. A 2-cent stamp is pasted on the corner of the face and uncanceled stamps to the extent of the remittance are attached to the back. The card is redeemed in cash when presented at any post office in the United States. It is enclosed in an envelope and addressed as an ordinary letter.

E. W. GRAY, has been appointed manager of the Americus (Ga.) exchange of the Southern Bell Telephone Company.

ELECTIONS

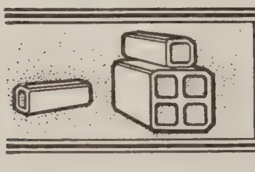
HILLSBORO, ILL.—The directors of the Peoples Mutual Telephone Company have elected officers as follows: A. G. Butler, of Fillmore, president; P. C. Wood, of Coffeen, vice-president; E. Harris, of Coffeen, secretary, and S. D. Canaday, of Hillsboro, treasurer.

SHELBYVILLE, ILL.—At a meeting of the stockholders of the recently incorporated Queen City and Shelbyville County Mutual Telephone Company, the following officers were elected: President, T. F. Dove; secretary, W. O. Bennett; treasurer, B. W. Kerr; directors (one year), Jacob Ulwer, W. O. Bennett, Michael Kessel; (two years), E. A. Richardson, W. T. Walker, B. W. Kerr; (three years), James Thomas, George Griffith, T. F. Dove.

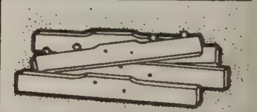
MONTICELLO, N. Y.—At the annual meeting of the stockholders of the Monticello Telephone Company, the following officers were elected for the ensuing year: John D. Lyons, president; A. A. Crain, vice-president; H. F. Holmes, secretary; Geo. L. Hatch, treasurer.

UNDERGROUND

DUBUQUE, IA.—Telephone wires must go underground in the business districts before January 1, 1906. That is the text of a new ordinance which City Attorney Barnes has offered to the ordinance committee. The ordinance was discussed and ordered read at the next meeting of the council.



New Construction in the Field



NOGALES, ARIZ.—Americans are to construct and operate an extensive telephone system in the State of Sonora, Mexico. Lines will be built in the cities of Guaymas, Hermossillo, Nogales, etc. The Sonora Telephone Company has been organized under the laws of Arizona to carry out the enterprise. Among those primarily interested are: L. W. Mix, Edward Titcomb, W. E. Bristol and C. C. Kingsley, all of Nogales; and F. E. Monteverde of Hermosillo.

PITKIN, COLO.—It has been determined to construct a telephone line from here to Bowerman. The promoters of the project are: S. Dickinson, W. S. Henderson, C. W. Winslow, and J. A. Wiseman.

GAINESVILLE, GA.—An Independent long-distance telephone line from Atlanta to Asheville, N. C.,is to be constructed at once by the Gainesville Co-operative Telephone and Telegraph Company. This announcement was made by John N. Oliver, of Gainesville.

CHAMPAIGN, ILL.—The Home Telephone company of this city has men securing subscribers along the main road between this city and Seymour and if a sufficient number can be secured, a line will be constructed from Seymour to this city.

JACKSONVILLE, ILL.—The Illinois Telephone company has finished a line to Springfield. The wires go into the offices of the Interstate Telephone and Telegraph company, which has recently established an Independent exchange in Springfield.

STREATOR, ILL.—The Independent Telephone company has ordered the material to put up a line between Streator and Cornell, which will make a connection with 200 additional telephones.

BROWNSTOWN, IND.—Representatives of the Seymour Telephone Company, and the Zollman, Trautman and Ruddick lines (which have been combined) met with the Brownstown Company, and came to an agreement whereby a long distance telephone line will be constructed from Bedford to Seymour, via Medora, Vallonia and Brownstown.

CARYDON, IND.—The Eureka Telephone Company of this city, is reaching out. The directors held a meeting recently and decided to purchase a new switchboard and telephones. The company will also proceed at once to line the city and make extensions.

LA GRANGE, IND.—Charles Griffith is building a new telephone line north-east from La Grange.

AUDUBON, IA.—The Audubon County Telephone company is putting in two new lines into the Country, one north-east, and the other north-west. The Farmers' Mutual Telephone company is constructing a line north-west into the Graves neighborhood. All these lines will connect at the central office in this city.

CENTERVILE, IA.—The Seymour Telephone Company has purchased a building; consideration $1,350.00 and will soon move its exchange.

THE WEEK'S MESSAGES—Continued

GOODRICH, KAN.—Parker & Goodrich have been connected by the Farmers' telephone line. A. G. Jones, J. S. Goodrich and Frank Bearley were in charge of the construction work. They will put in a line to Blue Mound.

LEVERETT, MASS.—The Valley telephone company is intending to extend its wires so as to connect the Leverett line with the Sunderland line.

OAKHAM, MASS.—The Conant and Parker Telephone Company which was recently incorporated with a capital stock of $500, intends to construct lines to Barre, Whute Valley and New Braintree. It already has two exchanges in operation with 20 subscribers. The rates are $12 and $15 a year. The officers are: Frank S. Conant, of Oakham, manager; Clarence H. Parker, of Oakham, president, and Harry B. Parker, of Coldbrook Springs, secretary and treasurer.

DETROIT, MICH.—The Cooperative Telephone Company is connecting the villages of Beech and Elm with Detroit by means of telephone lines. President Burton of the company states that the county of Wayne has the fewest number of Independent telephones in all Michigan and considers the field a good one to explore.

ESCANABA, MICH.—The Escanaba & Lake Superior railway has equipped its telegraph lines with composite telephones.

OWATONNA, MINN.—The Steele Center Rural Telephone System company is ready to erect its new telephone line.

WALNUT GROVE, MISS.—The Mutual Telephone Company of Walnut Grove, recently organized with a capital stock of $10,000, has constructed three exchanges and is now serving the towns of Walnut Grove, Estes, Millhouse, Tuscola Hill, Billy, and Piketown and several other towns. Its rates for service are 10 cents for three months. The officers are: B. W. Stewart, president and general manager; John E. Soldin, treasurer and secretary.

ST. LOUIS, MO.—The Kinloch Telephone Company has closed negotiations for a right of way for a line from Alton to Springfield, Ill., having procured franchises in almost every town along the way.

BOONE, N. C.—The new telpehone line to Blowing Rock has been completed. J. C. Horton, promoter of the Blowing Rock line, will put in a system of telephones in Boone in the near future.

WILMINGTON, N. C.—President L. A. Carr and Secretary and General Manager W. W. Shaw, of the Inter-State Telephone Company, with headquarters in Durham, are in the city. This fall work will be commenced upon a general overhauling, improvement and extension of the company's exhange in Wilmington. One of the first steps will be to apply to the city for permission to place the wires underground and the installation of a complete metallic circuit system.

LOCKPORT, N. Y.—Manager Harry W. Shannon, of the Lockport Home Telephone Company, R. A. Rawson, of Niagara Falls, manager of the Niagara County Home Telephone Company, and President Tuttle, of the Orleans County Home Telephone Company, met in this city recently and decided on connecting the line being built by the Orleans County Company from Olcott to Baker with the line being built by the Lockport company from this city to Wright's Corners.

OSWEGO, N. Y.—James H. Stockwell, manager of the Ontario Telephone Company and Harry McCaffrey, its treasurer, were recently given a hearing relative to a police telephone system for the city.

CLEVELAND, OHIO—President Dickson, of the United States Telephone Company, is planning an invasion of Cincinnati. He has given orders for the extension of the company's lines from Dayton, south to Middleton. A line from Middleton to Hamilton is already under way. It will be an easy matter to run the line from Hamilton to Cincinnati, when the new plant is built. From Cincinnati the United States company will build lines to Portsmouth, Wilmington and Milford, affording long distance connection all over the state.

STEELTON, PA.—The United Telephone and Telegraph company has determined to secure larger quarters for its exchange and will erect a new brick building. The franchise secured in Middletown recently compels the company to secure larger quarters for the installation of additional switch boards and other equipments.

HETLAND, S. D.—Work has begun on a new rural telephone line which will connect with the system at this place. It is proposed to run another line southwest from town. It will connect with a line which runs in a southeasterly direction from Lake Preston.

DENNISON, TEX.—J. F. Noble, of Shawnee, Okla., president of the Independent Long Distance Telephone Company, building from Dennison to Joplin, Mo., was in the city recently, accompanied by E. D. Nims, of Muskogee, I. T., secretary of the company. Mr. Nims stated that the Independent Company is expending $200,000 on its new line, building 2,000 miles of toll line, with twenty-five exchanges in the principal cities of Oklahoma and Indian Territories.

CLARKSBURG, W. VA.—The Consolidated Telephone Company of Clarksburg and Fairmont has decided to extend its lines to Wheeling, Uniontown and Pittsburg.

ASHEBORO, N. C.—The Asheboro Telephone Company has connection with Farmers through the Caraway Telephone Company. At Fairmount in Davidson county, there is a line to Lexington and also a line to Spencer and Salisbury. The line is to be extended from Fairmount to Denton and thence to Jackson Hill. Jackson Hill is twelve miles from Farmers and Denton is only about nine miles from Farmers. The line from Farmers connecting with Asheboro and all places connected with the Asheboro system should be extended to Denton or to Jackson Hill.

BATAVIA, N. Y.—The Home Telephone Company of Batavia has secured the right of the property holders on the creek road to place poles for a line from West Bethany to Batavia.

CANANDAIGUA, N. Y.—The Interlake Telephone Company of this place will son make connections with the Gorham, Stanley, Rushville and Hall's Corners line and also with Penn Yan.

Flint, N. Y.—The Seneca-Gorham Telephone Company has installed its instruments in the homes of subscribers through this village, and people on the same line can carry on conversations, but are not yet connected with central, which is to be located at Stanley as soon as the new switchboard arrives.

SENECA FALLS, N. Y.—The Home Telephone Company is preparing to run its lines from this village to Bridgeport.

WILLIAMSON, N. Y.—The Rochester Telephone Company has established a local telephone exchange in Williamson, and has secured sixty subscribers.

BARTLETT, O.—Poles are now set for a line to Pennsville by the Bartlett Telephone Company. A switch will be located at Rosseau.

URBANA, O.—The work of building the United States Telephone Company's line from the county line to Springfield has been commenced. Lorian Kerr, J. M. Gamble and C. M. Steiger of the construction crew took charge of the work. This city has connection with Dayton over the Independent line now, but in order to talk with Dayton it is necessary to connect via Kenton and Columbus, while the new line will do away with this roundabout circuit and give communication with the Gem City direct. The Independent company is rapidly finishing the work of constructing its plant in Springfield, and it is expected that within the next thirty days the work will be completed.

WAPAKONETA, O.—The St. Mary's Telephone Company has just let the contract for the construction of an automatic telephone system, which will be erected as soon as material can be obtained.

CONNELLSVILLE, PA.—Superintendent C. A. Berg, of the Tri-State Telephone Company, states that the company had decided to build an Independent line from this section to Pittsburg. The company is also preparing to make connections with the Maryland, West Virginia & Pennsylvania Telephone Company, which will give Fayette county connections with all towns between here and beyond Cumberland.

INDIANA, PA.—At a meeting of the directors of the Indiana Telephone Company, Superintendent J. C. Rugh was authorized to spend $5,000 additional in finishing the Saltsburg line and in improving the Indiana lines. The work of placing the entire system on a metallic circuit will proceed, and the wires on Carpenter, Nixon and Gompers alleys will be put underground.

KNOXDALE, PA.—Emanuel Reinert and J. L. Cummings, representatives of the Brookville division of The Farmers' Telephone Company, have arranged for connection with the Cool Spring, Knoxdale and Reynoldsville divisions of The Farmers' Telephone Company.

WAYNESBURG, PA.—The Standard Telephone Company of this place, and the National Telephone Company of Wheeling, W. Va., have arranged to build a line from Waynesburg to Wheeling.

BEAUMONT, TEX.—Manager Heyward, of the Beaumont Northwestern Telephone Company, is making the long distance equipment from Silsbee to Kountze a metallic circuit. A local exchange is being placed at Saratoga, and it will be in practical operation within thirty days. Four metallic circuits are being run out of Saratoga, two of which will come to Beaumont and one to Houston.

GAINESVILLE, TEX.—G. R. Butler, of Chicago, Ill., one of the superintendents of the Independent Telephone Company, is in the city making arrangements for erecting poles and stringing wire for the Independent system. Long distance wires connecting Gainesville and Fort Worth are to be erected shortly and service between these points will be ready at the beginning of the operation of the new system in this city.

SONORA, TEX.—Rust Bros., of San Angelo, are putting in a system of telephones at this place.

PETERSBURG, VA.—The Petersburg Telephone Company has completed its line to City Point. The company within the past year has greatly added to the convenience of the people of this city by extending its lines to various points in adjoining counties.

WEST HALIFAX, VT.—Walter Kinsman and D. G. Taylor have been here in the interest of the Heath Telephone Company. A line is contemplated from Jacksonville through West Halifax to Halifax Center.

TRADE NOTES

The Eureka Electric Company, of 143 South Clinton Street, Chicago, Ill., has favored us with a copy of its catalogue, No. 23. The book is very well gotten up and the illustrations and descriptions are of more than passing interest. Both central energy and magneto apparatus are described. The rear is given to circuits. Diagrams, which are of interest to all telephonists, are shown of some of the different circuits the company employs in its apparatus. The catalogue will be sent free to anyone interested.

The Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., and Chicago, Ill., has issued a little booklet which it has named "With A Telephone At Your Right Hand Your Department's At Your Command." The booklet is descriptive of the central energy intercommunicating telephone systems that the company manufactures and contains excellent half-tone cuts and good descriptions of the different apparatus. A list of over 30 firms in Rochester and over 40 in Chicago that have installed the system is given. The operation of the apparatus is explained and lists are given of the material required to install systems of different capacities.

The Kellogg Switchboard and Supply Company, of Chicago, Ill., has under course of construction at its factory the following apparatus. A straight multiple exchange equipment is being made for Cleveland, Ohio, with an immediate equipment for 7,680 lines, in 18 sections of three positions each, with an ultimate capacity of 18,000 lines. The new Kellogg four-party selective system is to be installed in connection with this exchange, each cord circuit having a four-button indicating ringing key in addition to the regular cord equipment. This switchboard is to replace the old four division equipment now in use in Cleveland, which was at the time it was installed nearly four times as large as the largest straight multiple board then made. The old Cleveland board is of the local battery type, and it was considered less expensive to install an entirely new equipment than to change it over to work on centralized battery.

Common battery exchanges of the latest type are being constructed for the following cities: Pasadena, California, 1,500 lines present equipment, mounted in a framework for 7,200 lines ultimate; McKeesport, Pa., 1,000 lines present equipment, mounted in 3,600 line framework; London, England, for Lavender Hill Exchange, National Telephone Company, 800 lines present equipment; Linton, Indiana, 800 lines present equipment, with 3,000 lines ultimate; St. Louis, Mo., South Office, 2,520 lines present equipment, with 7,200 lines ultimate, requiring at present nine sections of three positions each; St. Louis, East Office, 1,080 lines present equipment, with 7,200 lines ultimate, requiring five sections for present installation; Taunton, Mass., 300 lines present equipment, 800 lines ultimate. Also four complete common battery switchboards of about four hundred lines present equipment each, for San Bernardino, Long Beach, Santa Ana and Redlands, California. These latter have each an ultimate capacity of 1,200 lines.

All the manually operated switchboard equipment to work in conjunction with the Automatic Exchange at Dayton, Ohio, and Grand Rapids, Michigan, is nearly completed at the Kellogg Factory. The apparatus for Dayton consists of a multiple toll board of two sections of two positions each, also a wire chief's desk and a combined trouble clerk and information clerk's desk, each of the latter having two positions both equipped. The Grand Rapids, Mich., equipment consists of a present equipment of nine two position sections of multiple toll board, and one two position section of rural line board; also a switching section of 12,000 lines capacity equipped for 5,500 lines and a two position chief operator's desk, a two position wire chief's desk, and 2 two position information clerks' desks.

In addition to the above new work, the Kellogg Company is making extensions to the following exchanges: St. Louis, main office, is to have an addition of two incoming trunk sections of four positions each. These sections are to work in conjunction with the present four division main office switchboard. Los Angeles, California, is to have a third extension of 1,080 lines, making the total equipment of the exchange 9,120 lines. Vincennes, Indiana, is to have a 160 additional equipment, making a total of 800 lines for present operation. St. Charles, Mo., and Belleville, Ill., are to have each an additional section equipment. The greater part of this work is now nearly ready for installation.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

TELEPHONE SYSTEM. Telephone system in Northwest Arkansas, 200 miles in operation, 325 subscribers, 200 miles extension needed immediately. No Competition. Excellent connections can be had with Indian Territory, Joplin, Springfield and other Missouri points, also Little Rock, Arkansas. This line is key to the situation. Pays 15 per cent. annually, best prospects to pay 25 per cent. inside of a year. Boom in progress. Three new railroads building, also electric line and two other roads under survey. Lack of transportation has heretofore retarded the growth of the country. Good reasons for selling. Address, HERMAN H. VER MEHREN, 633 Paxton Block, Omaha, Neb.

PROPOSITION—$75,000. The best telephone proposition in the Independent field to-day is offered on exceptionally reasonable terms to the party or parties who can handle a deal of $75.000. Rates are high, conditions are excellent for selling stock and bonds after the plant is in operation. Only those parties who can take up the proposition at once and show they can control the money will be considered. Address CHAS. F. SPEED, 1983 Kenmore Ave., Chicago, Ill.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

THE LIBRARY OF CONGRESS desires to secure Volumes 1, 2, 3 and 4 of The American Telephone Journal for its file. Parties who may have these volumes, or parts of them, which they would like to dispose of, please communicate with the LIBRARIAN OF CONGRESS, Washington, D. C.

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau street, New York City.

POSITION.—Thoroughly experienced telephone manager now successfully operating 500 line common battery plant, desires position with progressive Independent company. Best references from present and former employers. Address, Box 82, The American Telephone Journal, 116 Nassau Street, New York City.

POSITION.—Competent telephone man desires position. Has had twelve years' experience in underground and aerial construction, estimating, managing plants, etc. Address Box 81, The American Telephone Journal, 116 Nassau Street, New York City.

POSITION.—Wanted position as manager in Iowa or Illinois. Capable of taking full charge of 200 to 500 subscribers. Either system. Nine (9) years' experience in all branches; 30 years old. Married, sober, and industrious. Best of references. Address Box 84, The American Telephone Journal, 116 Nassau Street, New York City.

The American Telephone Journal

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VOLUME VIII *SATURDAY, SEPTEMBER 19, 1903* *NUMBER 12*

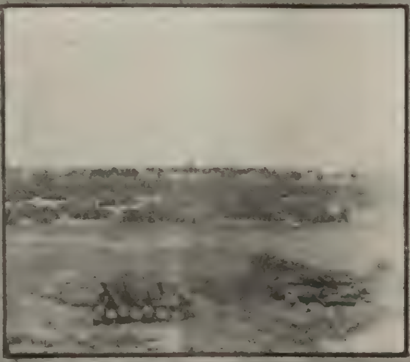
TELEPHONE CONDITIONS IN COLORADO

By H. B. Van Sickle.

In these days of rapid progress of the Independent telephone systems in the various parts of the country, it may be interesting to hear of a state wherein practically all is left to the future to develop, and it is a safe wager that the field will furnish some splendid openings for investment before many years roll around. The writer has just returned from a trip of recreation in the much advertised state of Colorado, travel furnishing the diversion sought. Upwards of 1,200 miles were passed over within the borders of the state and though it was difficult to get a great deal of data in the way of figures, much was open to the observation of one who chanced to be interested in the telephone situation.

The Colorado branch of the Bell Co., is practically in full telephonic control of the state, and it would appear that it has not been idle. Large construction gangs were passed in various parts of the state, beside mile after mile of new line. To the Northeast of Denver over a large range of farming territory, could be seen zigzagging over the plains, party lines, that seemed to connect the entire ranch district into one general system. The poles were new, and while the construction was not heavy, it, nevertheless, in every case exemplified good practice. A great deal of copper wire is used, especially in the main leads.

Main Street, Buena Vista, Colorado.



Country Around Delta.

On Top of Pike's Peak.

It is quite a surprise to one familiar with eastern Independent telephone development to enter a city the size of Denver and find but one company the apparent master of the situation, viz., the Bell. The time however cannot be far distant when something will be done. One hears here and there the rumble of dissatisfaction at the delay among the business men. The rates are higher than they should be, so competition is sure to come. The mining territory is fully as well supplied with telephone connections as the farming districts. It can be easily seen that the cost of building mountain lines is far greater than that of those on the plains. In fact, the life of the "trouble shooter" must indeed consist of a series of hair raising adventures. Many lines may be seen stretched from one high cliff to another, some follow the railroad, others the highways, while others dart off over the mountains regardless of the roughness of the path.

In Montrose county the U. S. Government has lately set aside $3,000,000 to be used for developing irrigation. Thousands of acres of land have been improved and found to be the very best for fruit raising. The county seat of Montrose stands in the center of one vast fruit orchard. This fruit belt extends onward to the north and west taking in the major portion of Delta county. This portion of Colorado shows the most recent activity in telephone building, both county seats are well supplied and new lines lead in every direction, connecting the homes of the fruit growers with the towns, and those who were buying the service did not always dwell in the most prosperous appearing mansions either. The connecting link between Montrose and Delta was being built from each direction, workmen were to be seen on either side of a gap of perhaps five miles. The poles were distributed along the entire route ready to be set.

One other district, Mesa county, was the next of importance. Grand Junction, the county seat, is similarly situated to Delta, though many miles over a high range of mountains to the northwest. Irrigation has also made this a most productive fruit section. This territory seems a little further advanced than its neighbors, perhaps on account of the orchards being older. The same telephone condition prevails here; the town and country is completely connected. One of the rural residents was overheard to say that he depended upon his telephone to keep in quick touch with the fruit market's demands and prices, and when one considers the shipment of 2,000 cars of fruit from this one center, others must have relied upon their telephones, to handle with profit and dispatch such an amount.

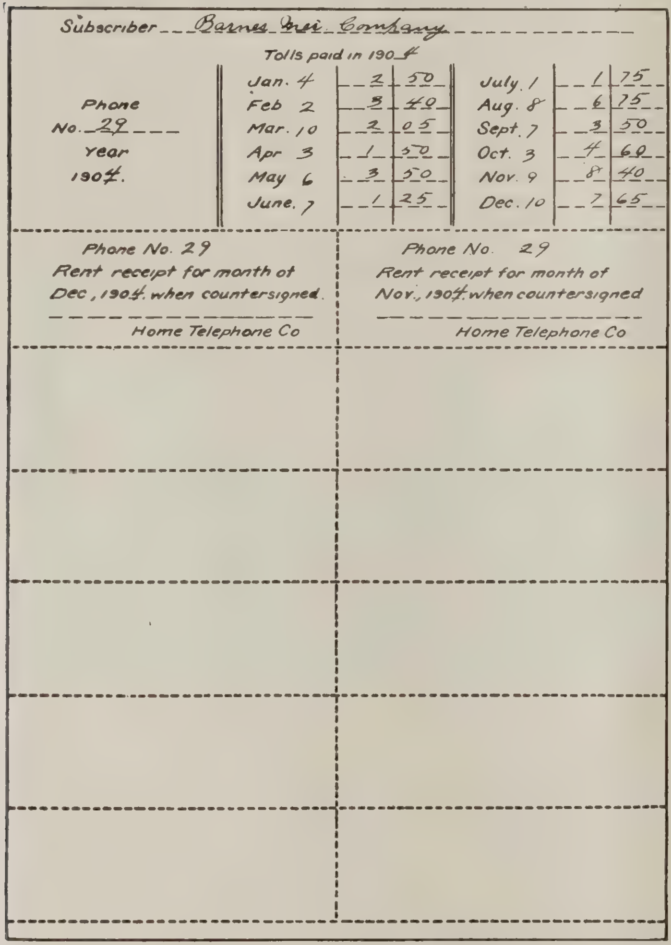
On the return trip through Central Colorado nothing of special interest in telephone lines or construction presented itself until Buena Vista was reached. Here, nestling in the foot hills, lies a little business center seemingly better supplied with telephone service than others of its size. The accompanying illustration shows the main street, a perfect network of wires. The poles are freshly painted and the wires glisten in the sun, which would indicate a very recent construction. One of the few Independent lines in the state is that owned by the Cog Railroad, which extends from their station at the base of Pikes Peak to station on the summit. Not a great deal is claimed for this line by its owners as an income earner, nor does it stand as an example of fine construction. It is, however, a metallic magneto system, its line getting to the top of the Peak in almost any practical way. Many of its poles above timber line are scarcely six feet high. One of these poles may be seen at the right of the observation building on the top of the peak, which is shown in the photograph. The writer asked a conductor of one of the trains if the telephone was used by the dispatcher to operate the trains, and he said: "Oh no, the telegraph is the official line over which we get our orders, but when any of us have any important conversing to do, that we want to do direct, we depend upon the telephone." He laughtd and said, "It serves one better at times to be able to send a few cuss words direct to the fellow who sits in the office."

Taken as a whole, Colorado belongs, as yet, by right of occupation to the Bell company, and until some one appears upon the scene with a yearning for a division of the profits she may be classed as a future field for the Independents. It would be well for prospective investors to look toward this field.

HANDLING TELEPHONE RENTAL ACCOUNTS

By J. D. Mossman.

When the writer took hold of the work of handling telephone rental accounts, about a year ago, for the exchange at Lebanon, Kansas, it was found that a great deal of unnecessary work was being done and that the results were not entirely satisfactory. The old stereotyped "long form" receipt was being written out for each person who paid the monthly telephone rental or toll fees. In this part of the country the rental on telephones and the toll fees are collected monthly. The charge for a business telephone is $2.00 a month and that for a residence telephone $1.00. The writer had coupon blanks printed in quantities, an illustration of the form of which is given. They were bound in a cardboard binder by means of brass fasteners, there being in the binder one yellow sheet like the illustration, for each business subscriber and a pink one for each residence subscriber and in the back of the binder there were a few extra sheets of each color to be used for any subscribers that might be acquired. The book was made up at the beginning of the year and lasted throughout. When a collection of a telephone rental is made all that is necessary for the subscriber's receipt is the coupon upon which the collector signs his name. It is then taken from the book and given to the subscriber. The amount of toll fees collected and the date of payment are entered at the top of the page, as shown in the illustration. At the end of the year when all the coupons are paid, the stubs show a complete history of each account for the year. These items may be posted in another book, if desired. It has been found a good scheme to keep another book, which was printed to order, which has a page for each subscriber, and in it all payments of telephone rental and toll fees are posted and also therein all other desirable information as to the account, may be kept. Any kind of a statement may be used for the toll fees. The drawing illustrates one form that has been found convenient but it is probable that this will be improved upon. The central office is provided with a book and coupons which are written up each day. This book shows nothing but a record of the toll fees or conversations. It gives the date of conversations, station calling, station called, amount of fee and to whom the toll charge should be made. A record is also kept in this same book of the cash that is paid by parties who hold their conversations over the toll line telephone in the central office. From this book the toll charges are made up, to be presented to and collected from the subscribers. What was sought in the designing of this little account system was simplicity combined with accuracy. This plan seems especially well adapted to exchanges not having over two hundred telephones. It has been found that the system here outlined is well worth its preparation.



Subscriber Barnes Mer. Company

Tolls paid in 1904

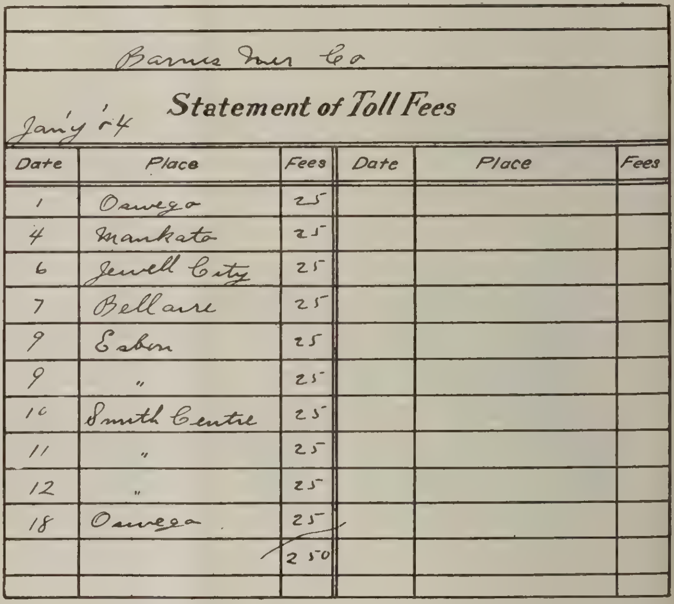
Phone No. 29
Year 1904.

Jan. 4	2	50	July. 1	1	75
Feb 2	3	40	Aug. 8	6	75
Mar. 10	2	05	Sept. 7	3	50
Apr 3	1	50	Oct. 3	4	60
May 6	3	50	Nov. 9	8	40
June. 7	1	25	Dec. 10	7	65

Phone No. 29
Rent receipt for month of
Dec, 1904. when countersigned.
Home Telephone Co

Phone No. 29
Rent receipt for month of
Nov., 1904. when countersigned
Home Telephone Co

Coupon Blank for Keeping a Record of Telephone Rental Collections. This is about 3/4 the size of the original blank. Only two of the twelve (one for each month) coupons are shown printed in the drawing, but of course in the original, all of them are filled in. The dotted lines indicate perforations. The blank is perforated so that the coupon may be easily torn out, having been signed, and given to the subscriber as a receipt.



Barnes Mer Co

Jan'y '04 **Statement of Toll Fees**

Date	Place	Fees	Date	Place	Fees
1	Oswego	25			
4	Mankato	25			
6	Jewell City	25			
7	Bellaire	25			
9	Esbon	25			
9	"	25			
10	Smith Centre	25			
11	"	25			
12	"	25			
18	Oswego	25			
		2 50			

Toll Fee Statement.

TRAINING NEW OPERATORS

THE most trying period during the inauguration of any new telephone service is probably the time when the first subscribers' lines are brought into the switchboard and the operators first begin making connections. Whatever experience the young women may have had before, or however carefully the chief operator of the exchange may have instructed them before actual work begins, that stiffness which is characteristic of all new apparatus and the unfamiliarity of the operators with it, are sure to bring down upon their heads the wrath of perhaps even the most kindly old lady, because she does not understand that at the central office things are not as tranquil and cozy as at the abode of her household gods, to which the new telephone had just been admitted. Though practice under actual working conditions is the only really satisfactory method of instruction, it is essential that experienced operators shall become familiar with the arrangement of the apparatus in the new board which they are to handle, and it is, of course, absolutely necessary that girls who have never worked at a board, shall be given as much instruction as possible before they are allowed to come in contact with a subscriber.

Telephone Instruments Used for Practice.

The Frontier Telephone Company's office in Buffalo, New York, was opened for public service last March, with about 2,000 working lines—to subscribers in the business portion of the city—in operation. For a month before that time the chief operator had been probably the busiest young woman in Buffalo. She selected from among the applications on hand, a corps of a half dozen experienced assistants whom she instructed in the code she wished adopted, and then turned over to this faculty the prospective operators as they were engaged. These girls were taught :The meaning of the line supervisory lamp signals. How to handle cords, plugs, ringing and listening keys. To test a line first and plug in afterwards. To observe a set schedule of questions and replies which would make service uniform at all parts of the board.

Some 25 or 30 telephone sets were intsalled in a room near the switchboard and were so connected to the board that it was possible to order up connections which would test the operators' skill and accuracy in several ways. The photograph shows these instruments. The girls, under the instruction of one of the assistants, were sent to the instrument room, while the others took charge of the switchboard.

Calls were made from instrument to instrument on a preconcerted plan. For instance, a good many calls would be thrown in on one position suddenly so that the operator at the position would require relief from the operators at both sides. Then a busy line would be called for and then perhaps a group of numbers which would require the operator to put plugs very closely together in the multiple so that she had to be extremely careful in order to pick out the proper jack quickly. Prompt observance of disconnect signals was made an important point. A very interesting and beneficial rivalry was naturally created among the several crews, and in a short time the most inexperienced beginner showed considerable familiarity with the duties she was to perform. The method satisfactorily served its purpose.

THE U. S. BUREAU OF STANDARDS

By E. A. Price.

THE functions of the Bureau of Standards of the United States of the standards ; the comparison of the standards used in which is located in Washington, D. C., consists in the custody scientific investigation, engineering, manufacturing, commerce and educational institutions with the standards adopted or recognized by the government ; the construction when necessary, of standards, their multiples and sub-divisions ; the testing and calibration of standard measuring apparatus ; the solution of problems which arise in connection with standards ; the determination of physical constants and the properties of materials, when such data are of great importance to scientific or manufacturing interests and are not to be obtained of sufficient accuracy elsewhere.

The bureau will exercise its functions for any corporation, firm, society, etc., requiring the use of standards or standard measuring instruments, or for any individual requiring same, but it is stated, "for all comparisons, calibrations, tests or investigations, except those performed for the government of the United States, or State governments, a reasonable fee will be charged."

A great deal of the work of the Bureau of Standards is electrical, having to do with resistances—standard coils of 1, 2, 5, 10, 100, 1,000, 10,000 100,000 ohms ; low resistance standards for current measurements of 0.1, 0.01, 0.001, 0.0001 ohms. Also coils of resistance boxes, potenteometers, ratio coils. The work also includes standards of electric motive force—Clark and other standard cells—and direct current measuring apparatus, millivoltmeters and voltmeters up to 150 volts ; ammeters up to 50 amperes. All types of electrical apparatus are tested. The idea in view is to get a set of standards that will be as nearly perfect as possible.

Some of the apparatus used in testing is wonderfully accurate. One piece, a galvanometer, used for measuring currents and testing electrical instruments, measures, it is said, as low as one ten-millionth of an ampere,.

The Coast and Geodetic Survey has, as part of its scientific equipment, a magnetic photographic apparatus, with which it is observing the action of earth currents and making records of their force. The principle of this apparatus is simply the reflection of the movements of three inclosed (in glass) magnetic needles upon sensitized photographic paper carried on a revolving drum operated by clock work. The drum revolves continually, and the paper is taken off every two days and examined. Zigzag curves show magnetic disturbance, but if there have been none, the lines are straight.—*Abstracted from the Electrical Worker.*

THE ELEMENTS OF THE TELEPHONE

By B. C. Wilhelm.

INSTRUMENT setters, strictly so called, are not supposed to perform the work of inspectors, but merely to place the telephone properly on the subscriber's premises, and to connect it to the line, so that it will be ready for services. Nevertheless, it sometimes happens that the telephone instrument is sent from the shop in a defective condition, so that it cannot be used, and in such cases the defect is often so slight that it can be easily corrected. For this reason it is well for the instrument setter to possess a good working knowledge of the construction and operation of a telephone, so that he may in such cases save the time necessary to send an inspector to fix the instrument.

This paper will, therefore, start with the description of the fundamental principles of a telephone, and the development of these principles to make a complete instrument. In Fig. 1 are shown the essential parts of a telephone. At *a* is the transmitter; at *b*, the battery; at *c*, the primary winding of an induction coil. These three parts must be connected in series as shown, so that the current from the battery may flow through the transmitter and primary winding of the coil. If the connections are made in any other way, the telephone will not work satisfactorily. No matter how complicated the actual wiring the transmitter circuit of a telephone may seem to be, it can always be reduced to the plan shown in the figure. At *d* is shown the secondary winding of the induction coil; at *e*, the receiver; and at *L*, the line. The secondary circuit must always be wired as shown, so that the receiver and secondary winding of the induction coil are connected in series to the line. No matter how complicated the actual wiring of the receiver circuit of the telephone may seem to be, it will always reduce to the plan shown in Fig. 1.

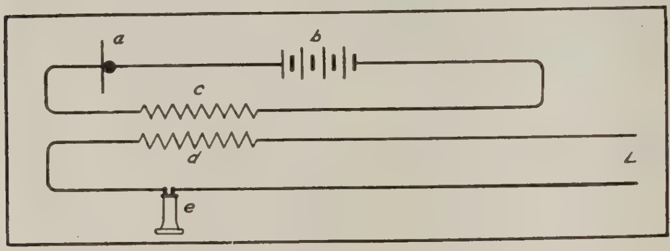


Figure 1.

In addition to the essential elements shown in Fig. 1, there are others which may be called auxiliary, for the reason that while they are not essential for the purpose of transmission, they have still important functions to perform. First, the telephone must be capable of *receiving* a signal sent *from* the distant station; and also capable of *sending* a signal *to* the distant station. The device used for receiving signals is an electric bell, which is actuated by a current of electricity sent from the distant station. The device usually used for sending a signal to the other end of the line is a *generator*. It consists of an armature which is made to revolve in a permanent magnetic field.

Bearing in mind the fact that the telephone must be wired as shown in Fig. 1, in order that transmission shall be good, the bell and generator must be so connected as not to interfere with this arrangement. There are two distinct methods of wiring the bell and generator, so that they may perform their functions and yet not interfere with the transmission. One is called the *Series Method*, and the other, the *Bridging Method*.

It is evident that there is no necessity in the transmitter and receiver circuits being closed, except during conversation; while, on the other hand, the bell and generator circuits must be closed when the telephone is not in use, that signals may be received and sent. To accomplish this a switch is introduced. This switch is so designed that when the receiver hangs on its hook the two above mentioned circuits are opened.

In Fig. 2 is shown the complete wiring of a telephone equipped with a series bell. The two binding posts to which the line is attached are shown at *a* and *b*. At *f* is shown the automatic hook-switch above referred to. The arrowheads *1* and *2*, represent two spring clips, which make contact with the switch when the receiver is removed; the switch moving upward for the purpose under the impulse of a spring. At *3* is shown a second spring clip, which makes contact with the switch when the latter is depressed by the weight of the receiver. The binding post *a* is wired directly and permanently to the switch *f* at *g*. Also wired to the point *g* is one terminal of the transmitter *h*, which is connected in series with the battery *j*, and the primary winding *d* of the induction coil *i*. The other terminal of *d* is wired to the spring clip *2*. The binding post *b*, is wired directly to one terminal of the induction coil *c*, while its other terminal is connected to one terminal of the receiver *e*. The other terminal of the receiver is wired to spring clip *1*. To spring clip *3* is wired the generator *k* and the bell *l*, in series, the other terminal of the bell being wired to the binding post *b*. Consider the receiver to be in its resting position, which will depress the hook switch; the contacts with *1* and *2* are broken, and that with *3* made. A circuit is consequently established from the binding post *a* to the point *g*, thence through the metal of the switch to the contact point *3*, from which it passes through the generator *k* and the bell *l*, to the binding post *b*. Current flowing over the line from the other end will pass through the generator *k*, the bell *l*, and out at *b*, and if this current be alternating, the bell will be rung. Should the crank of the generator *k* be revolved, an alternating current will flow over the circuit and through the bell *l*, ringing it, and the bell at the other end of the line. It should be observed that both the transmitter and receiver circuits are open at the contact points *1* and *2*. If the receiver be removed from the hook, the switch will move upward, breaking the contact at *3*, and making it at *1* and *2*. The new circuits formed are as follows: From *a* to *g*, thence through the metal of the switch to *1*, through the receiver *e* and the secondary winding *c* of the induction coil *i* to *b*. Transmission current, therefore, flowing over the line, can pass through the receiver and secondary coil, thus enabling conversation to be heard. The transmitter circuit is also closed, and current from the battery *j* flowing through it, by speaking into the transmitter transmission current can be sent to the other end of the line.

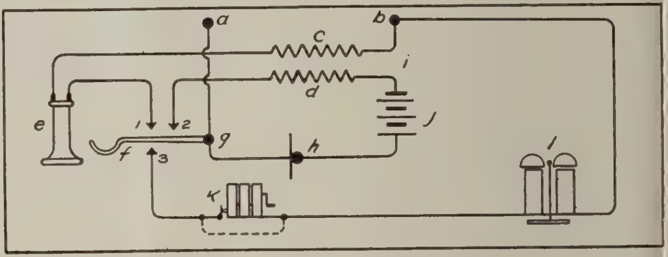


Figure 2.

By the arrangement shown in Fig. 2, the generator *k* and the bell *l* are kept out of the talking circuit, so that the transmitting current does not have to pass through them. It will be observed that the circuit through the generator is connected to both ends of a dotted line, which passes around the generator. This dotted line represents a shunt or "by-pass," around the generator amature, which is closed when the generator is idle. The object of this by-pass is to provide a path of no appreciable resistance to the flow of signalling current coming from the distant station, so that its full force may be expended in ringing the bell. When the crank of the generator is revolved, this by-pass is automatically opened, so that the current generated may flow out on the line and ring the bell at the distant station.

AGAINST THE MISSOURI AND KANSAS

SPECIAL COMMISSIONER SMITH'S report, in the mandamus proceedings brought by Kansas City against the Missouri and Kansas Telephone Company is an undeniable victory for the municipality. At every point the city's contention, that better and cheaper telephone service at a lesser rate, can be maintained with reasonable profit, was sustained. The report will be filed in the supreme court at the October term.

The mandamus proceedings were brought by City Counselor Ingraham to compel the Missouri and Kansas Telephone Company to obey the provisions of an ordinance passed last spring, fixing the service per annum at $60 for business houses and $36 for residences. The court appointed Hon. T. J. Smith, of Butler, Mo., special commissioner to take testimony in Kansas City and make report of his findings.

The company raised these main points:

First—That the city council had no power to fix telephone rates.

Second—That the Missouri and Kansas Telephone Company operated an interstate business and that the supreme court of Missouri had no jurisdiction.

Third—That to comply with the ordinance would render the business unprofitable and continued operation would be at a loss.

The special commissioner's findings *ad seriatum* are as follows:

First—That the mayor and city council have power by ordinance to regulate telephone rates.

Second—That the city passed an ordinance fixing an annual rate of $60 for business houses and $36 for residences.

Third—That there is an entire separation of the two plants, the Kansas plant being operated by a Kansas company and the Missouri plant by a Missouri company. This finding is based on the testimony of President Mulvane, of the Missouri and Kansas Telephone Company, and establishes the jurisdiction of the supreme court.

Fourth—That it is perfectly feasible to operate the local plant with the present appliances.

Fifth—That the ordinance granting a franchise to the Home Telephone Company is not an impediment in the way of enforcing the telephone rate ordinance.

Sixth—That the Home Telephone (Independent) Company is under contract to spend $1,000,000 and is spending it, and that it is bound by the $60—$36 rate.

Seventh—That since the Missouri and Kansas Telephone Company began business, it has made out of its earnings the $423,000 stock given to the Bell Telephone Company, and in addition has earned an annual dividend of 26.6 per cent. on the amount invested.

Eighth—That "in my opinion the evidence discloses no good reason why transmitters and receivers manufactured and sold by Independent telephone concerns could not be used in the giving of service by the Bell Telephone Company with as satisfactory results to patrons and at less cost than is incurred by using the Bell devices."

Ninth—That the parent concern (the Bell monopoly) compels the Missouri and Kansas Telephone Company and all subsidiary companies to buy Bell transmitters and receivers at higher prices than are asked for Independent goods of equal value.

Tenth—That there is no reason for compelling the use of the measured service in Kansas City.

Eleventh—That the local plant is valuable on account of its toll lines as well as its local businesss.

Twelfth—That it is not denied by the telephone company that during its history of twenty-one years that the annual net returns have been on an average of 32.5 per cent. of the capital invested. This was done when the business was in its infancy and not developed like it is at the present time.

Thirteenth—That the value of the physical assets of the company within the city limits is $857,000.

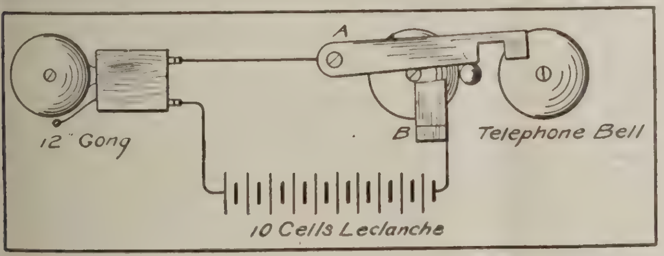
Fourteenth—That the cost of producing service in Kansas City is $27 per year per telephone.

Fifteenth—That from the tables of Moxey and Shelley and other testimony that the rates fixed by the ordinance, after making due allowance for maintenance, depreciation and operation, will yield the stockholders at least a dividend of 8 per cent. on their shares.

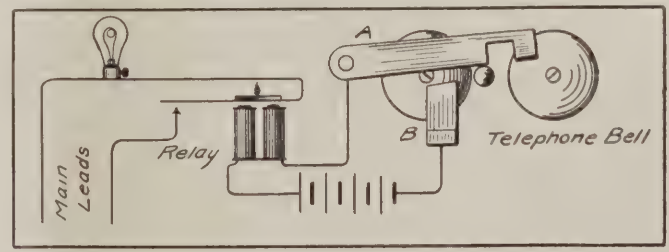
ATTACHMENTS FOR MAGNETO BELLS

By Chas. Amber.

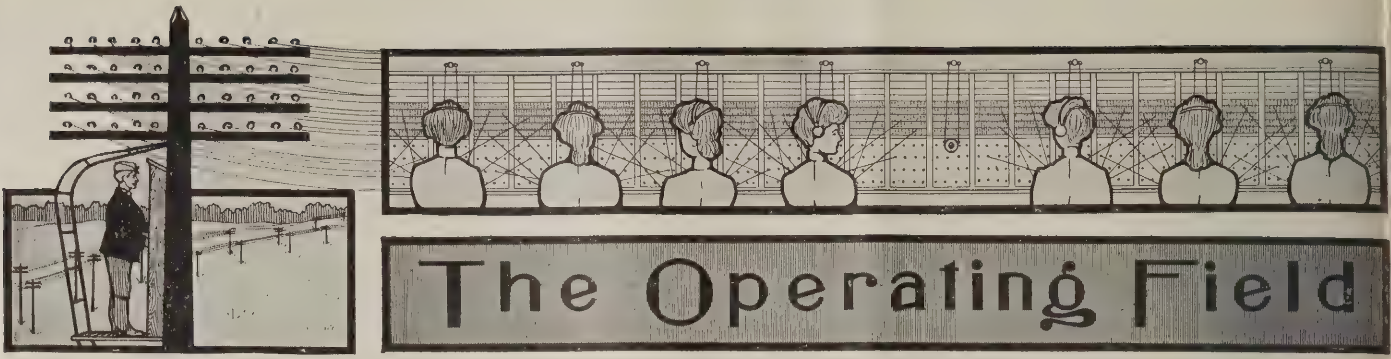
THE accompanying diagrams are almost self-explanatory, but some description may make them plainer. One of the arrangements is used to ring an alarm bell and the other to illuminate an incandescent lamp. The principles of operation of both of them are the same. The switch, which is made of thin sheet copper, is balanced on the hammer of the bell of a telephone in such a way that when the bell rings the blade is dislodged and falls, and makes contact with another piece of metal. This closes the circuit of a large vibrating bell as shown in the drawing. An extension can be soldered to the bell hammer if necessary, upon which the copper blade of the switch can rest. The details are not shown in the drawings. All that is attempted is to give the idea, as every individual would have his own way of putting it into practice. The second figure shows a relay inserted in the circuit instead of a vibrating bell. The relay is actuated by a local battery. The armature of the relay makes contact with a point as indicated and closes the circuit of an incandescent lamp. These schemes will be found valuable in shops and factories where the ordinary telephone bell could not be heard.



Extension Alarm Bell.



Incandescent Lamp Used for Alarm.



The Operating Field

WASHINGTON MILLS & NORWICH CORNERS FARMERS' COMPANY.

THE Washington Mills and Norwich Corners Farmers' Telepone Company, which has its headquarters at Washington Mills, Oneida Co., N. Y., is probably the largest Independent telephone company of its kind in New York State. With its connections this company reaches no less than 18 thriving villages and towns in Oneida and Herkimer counties within a radius of thirty miles. The entire system embraces some 75 miles of wire and pole line. Starting from New Hartford, 3 miles from the city of Utica, its lines reach Washington Mills, Norwich Corners, Ilion, Cedarville, Clayville, Saquoit, Paris Hill, Paris, Clinton, New Hartford, Willowvale, Chadwick, Frankfort, Frankfort Hill, Days Corners, North Litchfield, and Graefenburg.

One hundred and twenty-five telephones are in use which cost on an average of $14 per set, the line construction, which is on the whole very good, cost each subscriber about $12. During the past year the expense for line repairs and maintenance has been 75 cents for each subscriber. Phonograph concerts are frequently given during the winter months. Election returns and other news of general interest is sent out free of charge. The company holds semi-annual meetings for the purpose of auditing and paying bills and assessments for repairs to the lines. Officers are elected at the January meeting for the coming year. For 1903 the officers are as follows: D. D. Prescott, president; John Richards, vice-president; Charles H. Dodge, secretary and treasurer; Fred R. King, superintendent. The general switchboard is at the residence of Superintendent King, at Norwich Corners. Members of the same line can converse with each other free of charge, but where a connection is made with other lines a charge of 5 cents is made. This fund goes toward paying for maintenance.

THE NEW INDIANA AND OHIO SYSTEM.

By R. D. Fisher, *Special Correspondent.*

THERE was an important conference held at Indianapolis on the 11th inst., between Mr. Maxine Reber, vice-president of the Federal Telephone Company of Ohio, Mr. M. B. Overley, general manager of the United States Telephone Company, of Ohio, and M. S. P. Sheerin, president and general manager of the New Long Distance Telephone Company, of Indiana, relative to the building up of what is to be known as the Indiana-Ohio system. Arrangements were made at this meeting for the connecting of Indiana and Ohio lines at Richmond and two other points of the two states further north. A new line will be built by the Ohio people immediately from the State line near Richmond to Dayton, Ohio. Mr. Sheerin says the arrangement will be far reaching in effect and prove most valuable to the telephone world. These connections when made will give Indiana people connection with all of the Ohio towns and cities and will give excellent service as far east as Pittsburgh. In turn it will afford Ohio people access to all the Indiana telephones on the Independent system and a greater part of Kentucky and all prominent points as far west as St. Louis. Mr. Sheerin is highly elated over the interstate arrangement and says the Indiana-Ohio system will materialize into the biggest thing in the telephone world and prove marvelously popular not only by reason of its extent but because of the good service it will give.

FEDERAL SELLS ITS DETROIT INTERESTS.

THE Federal Telephone Company has sold its Detroit People's Telephone plant to a syndicate, headed by Joseph J. Heim, a millionaire brewer of Kansas City, Mo.; Arnold Kolman, vice-president of the Chicago Great Western and the Stromberg-Carlson Switchboard Company. The new people have already made application for a franchise in the city of Detroit and expect to complete the plant. A franchise, however, is not necessery, as under the Michigan laws a telephone company can operate without a franchise.

All the necessary conduits have already been built by the People's Company and half of the poles are erected. The telephone building is half completed and all that remains to put the plant in complete operation is to finish the switchboard, put in a few more poles and string the wires. The Federal Company had some $400,000 invested in Detroit, and while the purchase price is not given out, it is known that they allowed a liberal discount from this figure. The money has not yet been passed, but the sale of this plant will do much towards straightening out the Federal Telephone tangle. The sale of the People's Telephone plant disposes of the last property owned by the Federal Telephone Company which is not producing.

TELEPHONE CABLE TO BLOCK ISLAND.

FOR telegraph and telephone service to Block Island, a cable will be laid which is to span the Sound between Sandy Point, Block Island and Matunuck Beach, Rhode Island. The cable, the largest ever laid across the sound, will be 11 miles in length and the property of the United States Weather Bureau, to be used jointly by the bureau for its telegraph service and the Providence Telephone Company for long distance service to Block Island.

In the cable there are three conductors, each composed of seven strands of No. 22 copper wire, twisted together and insulated with okonite compound. The three covered wires are bound with three strands of jute, over which is okonite tape, and three layers of jute. It is wound with 12 No. 3 galvanized iron wires, coated with tar, then with another layer of jute, over which a layer of tar is applied. A fifth winding of jute is then put on and a coating of soapstone given the whole to facilitate handling. The outside diameter of the cable is about 1¾ inches, and the total weight of the 11 miles over 20,000 pounds. The manufacture occupied six weeks, and two days were occupied in loading it on the cars. The transportation of this great weight from the factory in Passaic to the wharf in Jersey City, where it was placed on a lighter was quite a problem. Three special freight cars, each with a capacity of 80,000 pounds were required.

KINLOCH LONG DISTANCE CONNECTIONS.

BY a deal which has been closed between the Kinloch Long Distance Telephone Company, of Missouri, and the Buffum Telephone Company, of Louisiana, Mo., St. Louis will receive long-distance connections with a large number of Northeastern Missouri towns which have not had telephone communication before. Charles H. Ledlie, general manager of the Kinloch Company is authority for the statement that in the near future the Buffum lines, which radiate from Louisiana through all of that territory north of the Missouri river and east of Mexico, including Fulton, Moberly and Hannibal, would be joined with the Kinloch lines at Montgomery, which place has already been reached in the extension of the local system.

One-fourth of the state which has heretofore had no means of communication with St. Louis, will now have facilities which will enable it to transact business with much more dispatch and convenience than formerly. Before the end of September the Kinloch Company will have its wires into Jefferson City, and the extension will be pushed west and south as rapidly as possible until Kansas City, Joplin and Carthage are reached. Wherever it is practicable, connections are being made with local branches.

LICENSE FOR NORTHEASTERN IN AUBURN.

LICENSE was granted the Lewiston and Auburn Telephone Co. as a local branch of the Northeastern Telephone Co., to install and operate an automatic telephone system in the city of Auburn, Maine, by a unanimous vote of the board of mayor and aldermen, at the regular monthly meeting. Conditions similar to those imposed by the city of Lewiston were required by the aldermen. There was no opposition to the granting of the petition. Hon. Henry W. Oakes, of Auburn, Hon. W. H. Newell, of Lewiston, attorneys for the company; Thomas R. Brooks, of Scranton, Pa., president; and J. B. Pierce, general engineer, and G. C. Benson, one of the directors, represented the company at the meeting. Petitions were read from outside towns and also one signed by 219 business men of Auburn, all praying that the Lewiston and Auburn Telephone Company be admitted. It was stated that the company would begin work immediately. With the admission of the Northeastern to Auburn, the campaign west of the Kennebec is closed.

NORTHEASTERN IOWA CONVENTION.

THE following program has been arranged for the regular meeting of the Northeastern Iowa Independent Telephone Association, which will be held at Cedar Rapids on Sepber 25:

Address of Welcome	F. J. Sessions, Secretary Commercial Club
Response	Hon. D. E. Voris, Marion
President's Address	Vic. H. Stevens, Dubuque
The Future Outlook	R. L. Parker, Gladbrook
The Present Telephone Situation	Dr. C. F. Bennett, Waterloo
Some Past Experiences	Fred. Bishop, Central City
The Farmer Subscriber—Is He Profitable?	H. F. Camp, Anamosa
Good Toll Lines	General Discussion
Where Are We At?	E. Duke Naven, La Porte City
Heart to Heart Talks	By the Members

The convention headquarters will be the Grand Hotel. The business sessions will be held in the Commercial Club Parlors.

NASHVILLE REJECTS MEYERS ORDINANCE.

By W. L. Arnold, *Special Correspondent.*

THE City Council Committee, of Nashville, Tenn., having determined to reject the ordinance providing for a franchise to the Harvey Meyers Company, the proposition was withdrawn. An effort to substitute the ordinance giving a franchise to the Tennessee Telephone and Telegraph Company, a concern generally credited with being a creation of the Cumberland (Bell) Company, failed to go through, as the City Attorney decided that it was in the nature of a new proposition and must take the course prescribed by the city charter and this meant a 90-day consideration of it. As the present Council goes out of office next month, it could not act on the matter,

MISSOURI & KANSAS TELEPHONE CO. OWNS KANSAS LONG DISTANCE TELEPHONE & TELEGRAPH CO.

D. W. MULVANE, attorney for the Missouri & Kansas Telephone company, recently presented papers and proved to the satisfaction of Mayor Bergundthal and City Attorney Spencer, of Topeka, Kansas, that the Missouri & Kansas Telephone company had bought out the Kansas Long Distance Telephone & Telegraph Company and receipts were shown for all the property, including the stencil plate, which was responsible for a good deal of the trouble regarding the poles in North Topeka. According to the papers the Long Distance Telephone & Telegraph company was purchased last January. It is officially stated that the papers were conclusive.

WOES OF AN ESTHETIC MANAGER.

IN Eastern Iowa there is a telephone company which is managed by an individual of rather esthetic tastes. Everything around his plant must look well and because things that look well usually are well, the plant is an efficient one and a dividend payer. Recently he decided that some of his poles did not appear in keeping with the rest of the installation, so he decided to paint them. The color chosen was a subdued green. The poles were painted and now there are two suits for damages against the company instituted by worthy citizens whose cows licked the paint from the poles and died. It is rumored that suits will be brought by the telephone company against the owners of the cows on account of the damage to the appearance of the pole line.

SERVICE BY NOVEMBER IN PORTLAND, ME.

THE new building of the Northeastern Telephone Company, in Portland, Maine, is rapidly nearing completion and will probably be ready for occupancy by November. Work on all lines is being pushed and the automatic switches have arrived ready for installation. The building is a handsome one and people in Portland are proud of it. The underground conduits are nearly completed, over eleven miles of cable having been laid, and offices and residences are being wired. After the exchange is completed connections will be made for as many subscribers as may be secured by that time and then the work will be pushed until the full complement is in operation.

PEOPLES' TELEPHONE COMPANY BUILDS.

A STANDARD cedar pole line is being built by the People's Telephone Company, of Naples, N. Y., which will add five miles to the lines of the company and seventeen subscribers to its Holcomb exchange. The company is also building from Allen's Hill to Honeoye Falls, through the natural gas field which will add West Bloomfield to its toll line system. The officers of the company are: H. W. Blake, president; J. Litzendorf, vice-president; G. B. Hemenway, secretary; G. R. Granby, treasurer and S. W. Abbey, tax adjuster. The offices of the company are at Naples.

UNITED COMPANY PROMOTES MANAGERS.

W. P. Beardsley, superintendent of District No. 6 of the United Telephone Company, was lately promoted to the superintendency of District No. 11, with headquarters at Harrisburg. The latter district is one of the most important districts in the service. N. E. Bobb, of Bellefonte, will succeed Mr. Beardsley. He is at present the head of District No. 5, which will be consolidated with District No. 6 and the headquarters continued at Bellefonte.

NEW MANAGER FOR CUYAHOGA.

O. F. FRENCH, assistant engineer of the Federal Telephone Company, has been made acting general manager of the Cuyahoga Telephone Company in place of F. V. L. Turner, who has left the service of the Cuyahoga Company. The change has been expected for some time. It is not yet known whether Mr. French will be the permanent general manager of the Cuyahoga or not.

UTICA COMPANY'S NEW DIRECTORY.

THE Utica Home Telephone Company has issued a new directory containing the names of 2,140 subscribers. The company has just completed two toll lines to Trenton Falls, one of which will be used for public service and the other for the exclusive use of the Utica Gas & Electric Company.

The Editor's Page.

THE CORRECT WAY TO TALK.

OUR esteemed contemporary, the London *Electricity,* recently gives, apropos of a much described sanitary contrivance for telephone transmitters, some directions to those who use the telephone, that, according to American practice sound rather remarkable, to say the least. In its recent editorial *Electricity* says: "The telephonically inclined Yankee has of late developed the mania for sanitary attachments for telephone transmitter mouth-pieces, all tending to the mistaken opinion that it is necessary to get the lips right up against the transmitter diaphram, or in all events, as near as is consistent with the freedom of speech. Speak clearly and distinctly with the lips on a point about one foot away from the transmitter mouthpiece."

In the old bygone days of the Blake transmitter such instructions were not so far out of place, because if the lips of the speaker were too close to the diaphragms and the voice was unduly raised, the puffs of the breath impinged upon the diaphram, and as there was but a single contact, set it vibrating in an improper manner, so that the hearing at the far end of the line was seriously interfered with. But in these modern days of improved solid backs and granular buttons the preceding instructions are the most erroneous that could be given. In the solid back transmitter the rear electrode is mounted upon an anvil, and it is impossible to set it vibrating after the fashion of the duly respected Blake platinum contact. We have always understood that British telephony was considerably behind the art here in our own country. Therefore it is quite possible *Electricity* still uses a Blake transmitter, and thus is advising its friends in all good faith from an experience that is limited to an instrument that, while in its time, it faithfully performed its service, is in this country entirely obsolete and relegated with other relics to the scrap heap. We must therefore, make due allowances for the ancient equipment possessed by our friends across the water.

Considering the universality of the telephone there is a surprising amount of ignorance displayed in its use. Telephone talkers may be divided into three classes. First, there is the man who disrespectfully turns his back to the transmitter, gazes at an invisible point in the ceiling, and indistinctly mumbles something that causes his correspondent to think, if he does not speak, in broken dashes. Then, there is another class of speaker who thrusts his face into the voice funnel, after an apparent frantic endeavor to call into the instrument, and shouts as if he were in the middle of a ten-acre lot. Finally, there is the individual who, so far as pose is concerned, conducts himself with a perfection of telephone etiquette, but talks as if his mouth was full of the proverbial hot mush, running his words and sentences together in an indistinguishable jumble that sets all those who listen to him almost frantic. To be a good telephone talker is something of an art, but in these days it should, by all means, be cultivated as much as any of the methods of polite conversation. The first requisite is the proper pose. In all cases the transmitter should be as nearly vertical as possible, with the voice funnel so adjusted that it is on a level with the lips when the head is in the ordinary arched position of conversation. Then the lips should be held about an inch away from the funnel and directly opposite its center. The speaker should talk in a tone slightly above the ordinary conversational pitch, about in the same way as if he were speaking to a person across the room.

SOME TELEPHONE ETIQUETTE

But more than all, care should be taken to talk slowly and to articulate with the greatest distinctness. To be deliberate in what one says, and to make ample pause at the end of each sentence. The telephone is such a time saver that one even over a toll line need not be unduly worried in being in too much of a hurry to get through. On the contrary, time and annoyance for one's self and one's correspondent will be saved by talking slowly and allowing a little time for the mental reception of the ideas that one wishes to transmit. Nothing can be more erroneous in the use of a solid back than to stand at a distance from the instrument and endeavor to effect it by shouting at the top of one's lungs. It is difficult to describe correctly the proper pose to be used in talking, so one of the prominent manufacturers went to the trouble to have photographs taken showing the proper poise. These he had reproduced in one of his catalogues so doubtless many are familiar with the proper one to assume.

MAKING BETTER OPERATORS.

WHAT appears to be an idea, conductive to the rapid handling of traffic, is to be instituted by the Kansas City Home Telephone Company, in the operation of its plant. President Heim gives the following statement relative to it:

"Their (the operators') wages will be slightly better than those now paid by the Bell Company, and if the scheme to be tried proves a success, the telephone subscribers will have much to be grateful for. It will be something on the order of a merit scale. An operator will be paid according to her efficiency. It will pay a girl to keep her subscribers in a good temper, and she can manage this by giving them prompt service. When she finds out that her pay check varies with the mood of her constituents she will come to the conclusion, precisely as a business man does, that there is money in being on good terms with the customers."

The scheme seems to be an excellent one, and in view of its apparent practicability we do not see how it can help but be effecive. It is entirely just and reasonable that the operator, who best serves her subscribers and keeps them in the proper mood, is more valuable to her company than one who does not, and she therefore should receive an according salary.

The operators are to be uniformed, which idea also strikes us quite favorably. The uniform is to be a black dress, which will be set off by a white apron. Our correspondent reports that one hundred and forty operators are to be employed at the start. It is expected that there will be 8,000 subscribers. The task of breaking in so many young women to the exacting work of efficient operating will be not an inconsiderable one, by any means, but the men who manage the company know what is required, and we feel sure that the training will be well done. Relative to this we understand that Manager Judson is in Chicago, superintending the construction of a dummy switchboard on which the prospective operators will be trained.

SYSTEM IN SMALL EXCHANGES.

LARGE telephone plants have their records and accounts well systematized, frequently by card indexes, so any record is easily and quickly available. Usually small exchanges lack such system utterly. This should not be, because money is thereby lost. A step in the right direction is the method of recording telephone rental collections, which is described in this issue. Every small exchange manager will do well to read this and profit by it.

FOREIGN CURRENTS

By "The Arrester."

COMING to Hull it appears from the reports of the proceedings that have so far come to hand that when the municipality originally took up the idea of starting an opposition system some three years ago, it was largely supported by the rate-payers, who thought they were not being well or cheaply served by the National Telephone Company. Since then, however, the company has reconstructed its system, using a modern central energy plant, has introduced a modified tariff and as a result has largely increased its list of subscribers. Consequently there has grown up a powerful opposition among the rate-payers, many of whom thought that the municipal system would result in a large waste of money. A committee was formed of these opposing rate-payers to engage legal and expert advice and to fight the municipal scheme in an organized style. Hence the extensive proceedings at the enquiry, which lasted four days. Numerous witnesses were called on each side, and apart from the general witnesses who spoke for and against the public demand for the municipal system, each side had provided itself with two expert witnesses, one of those for the opposition being Mr. Herbert Laws Webb, late of New York, so that a lively technical discussion formed an important part of the enquiry. The expert witnesses for the municipality were: Mr. A. R. Bennett, who prepared the scheme, and General C. E. Webber, who gave a general approval to Mr. Bennett's plans and estimates. The other expert for the opposition, was Mr. J. E. Kingsbury, European manager for the Western Electric Company, who backed up Mr. Webb's evidence in general and said he was opposed to telephone competition anyhow—a most magnanimous admission for a manufacturer to make.

Mr. Bennett Explains

THE municipal scheme, as explained by Mr. Bennett, was along the familiar lines of telephone schemes prepared for British municipalities, purporting to provide for the construction of 2,070 completed lines at about $100 each and 600 "spare partially completed" lines at $40 each, making a total capital cost, with some extras and an allowance for contingencies of some $235,000. The system of working specified originally was the "ring-through" system, but a different system, with automatic calling, was now recommended though no explanation of the details was given. In cross-examination Mr. Bennett admitted that he had omitted to provide in his estimate for extension lines, and that the capital cost at Glasgow worked out at over $150 per working station. He also admitted that he had provided for some eighty-four different sizes of cable in his Hull scheme, and said that no inconvenience or difficulty would arise from that. The many different sizes were his own idea and he had done the same kind of work in Glasgow. The hilarity of the audience was provoked by Mr. Bennett's admission that at Tunbridge Wells he had recommended the appointment of one Joseph Chamberlain, who had formerly been a butler, to be manager of the municipal telephone system there. Said Joseph Chamberlain's chief advantages were his intimate knowledge of Tunbridge Wells and his wide acquaintance with its inhabitants. He would have made a good manager Mr. Bennett thought, with an electrician in charge of the technical work.

General Webber Supports

MAJOR-GENERAL WEBBER, late of the Royal Engineers, and a Past-President of the Institution of Electrical Engineers, gave a practically unqualified support to Mr. Bennett's scheme. He thought it was judiciously laid out, well-found and well-equipped and would involve no risk of loss. He thought that the municipality could undertake competition with the National Telephone Company with every chance of success. The value of the gallant Major-General's evidence may be gauged by his admission that he had had no practical connection with the telephone business since 1880, when he was for six months chairman of a telephone company! He had frequently given evidence before similar enquiries and before Parliamentary Committees. The following reply gives some idea of his expert knowledge of telephone working: Asked if he would not give the subscribers as little as possible to do in the working of the service, he replied, "Certainly not. That is the whole fallacy of the telephone business."

Mr. Webb Turns on the Searchlight

MR. WEBB, who stated that besides his long experience in New York, he was qualified to speak as a telephone expert from having extensively and on several occasions inspected the principal European telephone systems, broadly condemned Mr. Bennett's report, estimates and specifications. The report gave no idea of the real nature of the telephone business which demanded constant expansion. In a few years Hull would be drawn into an expenditure of nearly a million dollars, whereas the report and estimates gave the impression that the municipality would have a complete telephone system for $240,000. The plant recommended by Mr. Bennett was obsolete and would give a poor service, while his cable specification was a most unwise one, calling as it did for 84 different sizes of cable, ranging from 6 to 312 pairs, all joined solidly together by numerous 4-way and 3-way joints. The working expenses were much underestimated and would provide only for an ill-organized, ill-paid and inefficient staff. Depreciation was underestimated at 2½ per cent., with a brand new plant of the best description he would not put it at less than 5 per cent. He thought no new telephone service should be started to-day with anything but central energy plant, which had become the standard practice. On cross-examination Mr. Webb was asked if he had not taken American figures for costs, but the reply was that he was quite familiar with English practice and had used English rates of pay, etc., in all cases.

Mr. Kingsbury Fires a Volley

MR. J. L. KINGSBURY said he was in agreement with Mr. Webb in finding all Mr. Bennett's estimates and plans drawn on too narrow lines. He said the average capital cost per station of the National Company's plant throughout the country was $220, as against Mr. Bennett's proposed $100. The average cost of the Post Office, London, system also worked out at about $220 per station. The average working expenses of the National Company, exclusive of depreciation and interest, were $24 a station as against Mr. Bennett's $15. He thought Mr. Bennett's estimate of operating expenses wholly wrong, and he put depreciation at a little higher figure than Mr. Webb; he would say at least 6 per cent. instead of 5. American practice was generally an average of 7½ per cent. over the whole plant. He thought that a municipal system worked on the ring-through system would stand a very poor chance against the National System, giving a common battery service. Broadly speaking he was emphatically opposed to competition in telephone service. He was sorry to disagree with Parliament, but he did not think Parliament actually recommended competition, merely made it possible; moreover, he thought he knew more about the telephone business than any member of Parliament.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

CONNECTIONS WITH OPPOSITION COMPANIES.

"WHAT decisions or precedents can you inform us of concerning telephone connectious between opposition companies? Is it obligatory on one company to transfer the business of another, and if so, with or without charge? Also, can one toll line company come into a town, demand a telephone from the resident company and use it to transfer messages from their line to the resident company's subscribers? If they do so transfer messages, will they be liable for extra charge or message fee on each message transferred? At the monthly rental for private party telephone or business house telephone, we think it would be hardly fair to either transfer or do business for others without compensating the local company.

"F. N. H."

Unless there is a statute in your State making it obligatory upon one company to transfer the business of another, there is no obligation to do so. At common law, one common carrier could not demand as of right that it be permitted to use its rival carrier's property for the benefit of its own business. Express cases, 117 U. S., 6 Sup. Ct. 542, 628; Barney v. Steamboat Co., 67 N. Y. 301; People v. Hudson River Tel. Co., 19 Abb. N. C. 466. This rule applies to telephone companies at common law. People v. Central N. Y. Tel. Co., 58 N. Y. Supp. 221. In no case could it be required to do so without charge, as that would be equivalent to taking private property without just compensation. Chicago, M. & St. P. Ry. Co. v. Minnesota, 134 U. S. 418, 10 Sup. Ct. 462, 702; Ry. Co. v. Gill, 156 U. S. 649, 15 Sup. Ct. 484.

If there is a statute, we think it would not grant the right to demand a telephone for the purpose of transferring messages from one company's line to the other company's subscribers without paying extra charges on each message transferred. Out-- People v. Central N. Y. Tel. Co. *supra.* As said in that case, "it is foreign to the purpose of the act to permit another corporation, under pretense of using the line of its rival for purely private business, to use it to absorb the very business to which it was intended simply to permit it to contribute and profit upon the same footing as an individual." The resident company could make a regulation limiting the toll line company to its individual business, excluding that of its customers. Shepard v. Tel. Co., 38 Hun. 338.

A $10,000 JUDGMENT SUSTAINED.

THE Supreme Court of Utah has handed down an opinion sustaining the decision of the lower court in the case of Perry A. Black v. the Rocky Mountain Bell Telephone Company for damages for personal injuries. The lower court in Provo, Utah, awarded Black $10,000 damages, and the Supreme Court affirmed this award.

Plaintiff, who was employed as lineman at Provo, sued the company for $20,000. According to the allegations made in his complaint, he was at work on the crossarm of a pole when a wire that he was handling came in contact with a heavily charged wire of an electric light company, and he was thrown from the pole to the ground, twenty-five feet below. He sustained injuries that he alleged were permanent and would forever disable him from work. He claimed that he was not warned of his danger by the company, and that proper precautions were not taken to prevent it. The company's defense was that it was either the negligence of Black in not using his safety strap or the carelessness of a fellow workman that caused the accident and not its own negligence. The court held that a safety strap was not necessary because plaintiff was on a crossarm. It held also that the negligence of a fellow servant was not involved. Black v. Rocky Mountain Bell Telephone Co., 73 Pac. 514.

AN ENGLISH TELEPHONE CASE.

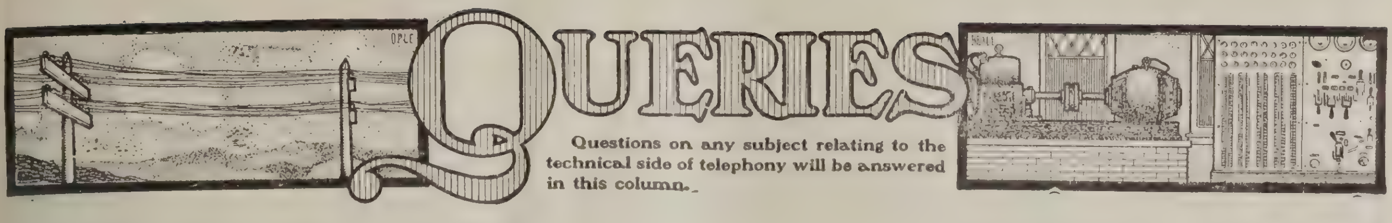
IN the City of London Court, Henry Lazarus brought suit against the National Telephone Company for damages for wrongfully cutting off his telephone service. According to the plaintiff's case, he became a subscriber three years ago to the defendant's service for one year and paid a fixed rent charge of £3 10s. a year. The company wanted to introduce a new method of payment to which the plaintiff would not agree, so his service was cut off. The court said in its opinion that the approval of the Telephone Company was requisite at the commencement of each year to enable the hiring to continue. The defendants did not approve of a continuance after the third year and were not bound to continue. No notice was stipulated for, but as the Telephone Company had decided to make a change in their terms, a considerable time before the expiration of the third year, they might reasonably have given the plaintiff more than the few days' notice that they did give him. The action failed, but he would have leave to appeal. As the legal aspect was doubtful, he ordered each party to pay its own costs.

NOT IN CONTEMPT.

THE Northwestern Telephone Exchange Company, of Minneapolis, Minn., made an application to the district court to have the officers of the Twin City Telephone Company punished for contempt. Last spring the Supreme Court of Minnesota held that the Twin City Company could not pass its lines beneath the wires of the Northwestern Company, but must overbuild them. Counsel for the Northwestern Company contended that after the order to show cause in the contempt proceedings had been served, the Twin City Company went to work and in four days had cleared away its wires. Before that it had taken them two months to change a very few. This, he contended, showed contempt. The Twin City Company asserted that it had done the best it could and had been hindered by electric storms. The four days' work referred to was only temporary and would have to be done over. The court did not think that wilful disobedience had been shown and dismissed the proceedings for contempt.

OHIO TELEPHONE COMPANY MAY RAISE RATES.

IN the case of Farmer & Getz v. the Columbiana County Telephone Company and the City of Salem, Ohio, brought to restrain the defendant company from raising its rates, the city of Salem filed an answer in the nature of a cross petition. In this document it admitted all the allegations of the plaintiff and joined in the prayer that an injunction be issued. The company contested the suit, and after a hearing before Judge Robinson, of Ravenna, secured a decision denying the injunction. The court did not file an opinion. The case will be appealed to the Supreme Court of Ohio.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

DENSITY OF ELECTROLYTE.—(193.)

As I understand it, the specific gravity of the solution in a fully charged American Storage Cell should be 1205 degrees. In what way would it affect the cell to have the specific gravity as high as 1225 on the charge?

P. C. E.

If the solution is denser than the manufacturer recommends it is apt to act upon the elements and injure the cell.

A COMMON RETURN QUESTION.—(194.)

I have a telephone plant which works on a common return. Two return wires are grounded at the exchange but I have a switch on the return between the switchboard and the ground, which, after opening, I can ring subscribers same as before. I know positively that the board is not grounded anywhere except on the return. Please explain why I can ring subscribers when return is open.

T. M. Q.

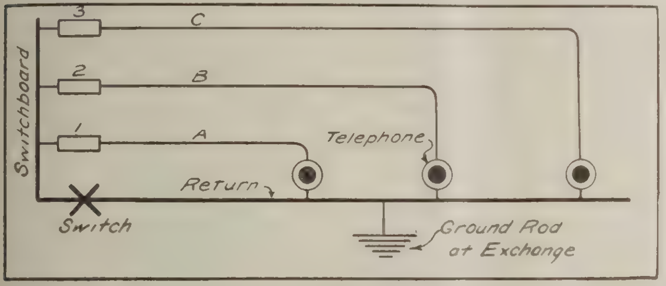


Fig. 194.

The ringing current goes around through the other subscribers' instruments and drops. For instance, if the switch at × in Fig. 194 was opened and it was desired to ring out on line *A*, the ringing current, which we will say is applied at *1*, would pass to the return at the switchboard, but as the return would be open at ×, in order for the current to get back to *1*, it would have to pass around through the lines *C* and *B*, and through the return. This is exactly what it does. If there were many lines connected in the way *C* and *B* are, which is the case in a large exchange, the resistance encountered would be small.

A PECULIAR INSTRUMENT TROUBLE.—(195.)

We have a telephone that is giving us a great deal of trouble. It is just like any other telephone except that we have taken off the battery box and use 2 Fuller cells which are on a shelf in the cellar. When the receiver is off the hook both lines test grounded. And when the receiver is hung up only one side shows a ground. I think that the trouble is in the telephone, but have not been able to find it. Will you tell me what you think?

E. B. M.

It is hard to tell exactly what the trouble is without an inspection, but we rather imagine that the 2 Fuller cells in the basement have something to do with it. This is a trick they often play. Reference to Fig. 195 will help make what we mean clear. An examination will show that if the battery is grounded at *g*, due to the damp air and moist condition of its surroundings, the side of the line connected to binding post *B* will be grounded, while if the receiver is taken from the hook the ground will show on both sides, due to connecting the two contact points *1* and *2* through the hook switch. Disconnect the battery at the telephone and test, and we imagine that you will find the trouble clears. Fuller cells should never be placed in a damp location, as they are prone to troubles similar to the one just described.

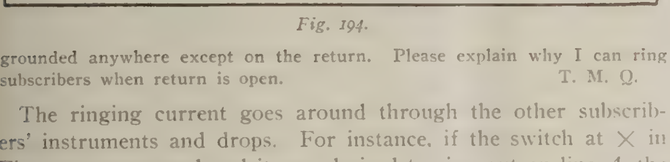


Fig. 196.

A VOLTAGE PROBLEM.—(196.)

What voltage would you get at *A B* in the diagram (Fig. 196)?

N. W. J.

The voltage available at *AB* is dependent upon the current flowing through the circuit. When the circuit is open as indicated in the drawing, the voltage at *AB* would be 24 volts. Just as soon, however, as any kind of a conductor is connected across *AB* current flows, and there would be a drop of potential in the circuit due to its resistance. Assume a wire of 10 ohms resistance to be connected across *AB*, the wire connecting the components of the circuit to have no resistance, and the battery to be composed of dry cells having a resistance of .3 ohm each, and for convenience an E. M. F. of 1 volt. Then the total resistance in the circuit would be (24 × .3 = 7.2 ohms) + (96 ohms) + (10 ohms) = 113.2 ohms total. Since by Ohm's law $C = \frac{E}{R}$

$C = \frac{24}{113.2} = 0.2 +$ ampere, which would be the current flowing under these conditions. When 10 ohms resistance is inserted between *A* and *B*, a voltmeter connected across *AB* would read, under the conditions specified, 10 × 0.2 = 2 + volts, because E = RC. Thus it is obvious, for every resistance inserted between *A* and *B*, there would be a different reading of a voltmeter connected across *AB*.

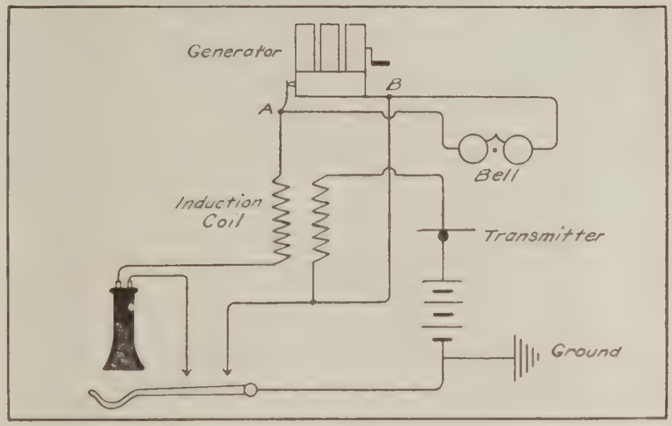


Fig. 195.

TROUBLE WITH FULLER CELL.—(197.)

We have a bridging wall type telephone which is supplied with current from 2 Fuller cells, which are on the floor in a box under the instrument.

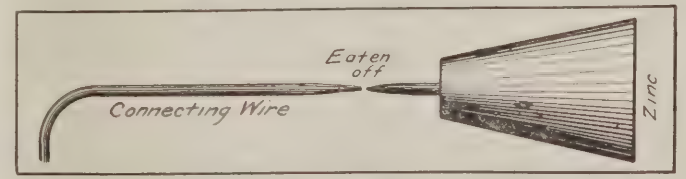


Fig. 197.

The connecting wire to the zinc of one of the batteries is continually being eaten off just above the zinc. We have replaced it several times lately. Can you enlighten us? The sketch (Fig. 197) shows how the wire breaks.

G. W.B.

Your trouble was probably due to a partial short circuit on the battery wire. Look for it at the point where it emerges from the box, or else behind the box. Lift the box and see if it is resting on the battery wire. Examine the wire where it is tacked to the wall and see if one tack has not been placed across both wires. Dry the battery box and jars thoroughly, and, if necessary, move them to a drier place.

PATENTS ISSUED

GUY ANCHOR.

G. H. Miller, of Norwalk, Ohio, patents (No. 736,995) an earth anchor. The invention consists of an easily made and applied anchor which can be used for guying wire fences and pole lines. Fig. 1 is a side view of the anchor in place, the earth being broken away to show the position of the anchor when arranged to receive the strain. Fig. 2 is a similar view, showing the anchor arranged for insertion into the earth before it is turned at right angles to the straining-wires. The anchor is inserted into the earth in the shape shown in Fig. 2. When the strain comes on it, it assumes the postion shown in Fig. 1.

Fig. 1.

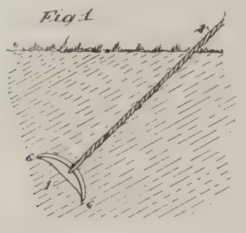
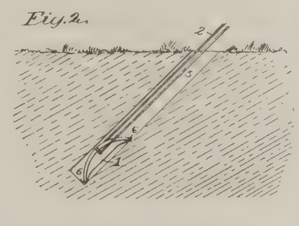


Fig. 2.



AUTOMATIC TELEPHONE SYSTEM.

Patents No. 738,156, No. 738,157, No. 738,158, and No. 738,159 are a series which are granted to J. J. Brownrigg and J. K. Norstrom, and assigned to The Globe Automatic Telephone Co., of Chicago. This is a series of patents that covers improvements in automatic telephone exchanges. It has previously been customary in automatic telephone exchanges to use a large enough battery to furnish power to move the automatic apparatus that is used to make connection between subscribers' lines. This requires a large and powerful battery. The object of the inventors of this series of patents is to devise an apparatus in which power shall be supplied by gravity and by compressed air, and to use electromagnetic mechanism only to operate the necessary valves and releases which so set the apparatus in operation, and not to depend upon the battery to supply any power. The general features of the apparatus are illustrated in Figs. 1, 2, and 3 from patent No. 738,156. Fig. 1 shows the circuit; Figs. 2 and 3 the general side elevations of the apparatus. From the circuit it is seen that there are two contact keys a^6 and a^7. By means of these two keys the subscribers can send impulses to the electro magnets S and C^3. As shown in Figs. 2 and 3 there is a vertical rod k provided. This carries a number of contacts L. In its normal position this rod is held by means of a catch P, which fits into notches cut upon the rod. Every time the button a^6 is pressed the impulse is sent over the line, and the rod allowed to drop one notch. By pressing the key a^7, the magnet C^3 is excited and the rod can be rotated one notch. By this means any combination of contacts from one to a hundred may be secured. As the rod falls by gravity, the electro magnets are not called upon to supply any power except that used to operate the catches. When conversation is completed the restoration of the receiver to its hook actuates the magnet f^4 (Fig. 1). In Fig 2 it is seen that this electro magnet controls a valve whereby compressed air may be admitted to the cylinder F^3. The operation of this compressed air is to move the piston C^3, and by this means restore the rod to its normal position. The four patents in this set form a very comprehensive series covering all the exceedingly complicated mechanism which the inventors use to attain their ends, and must be studied in detail by those desirous of comprehending the system embraced.

Fig. 1.

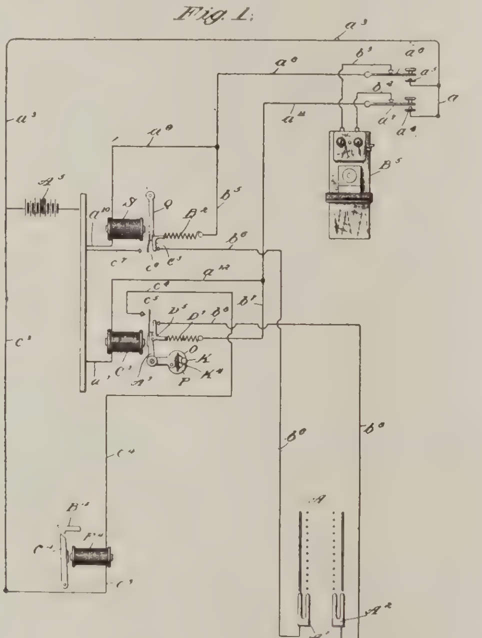
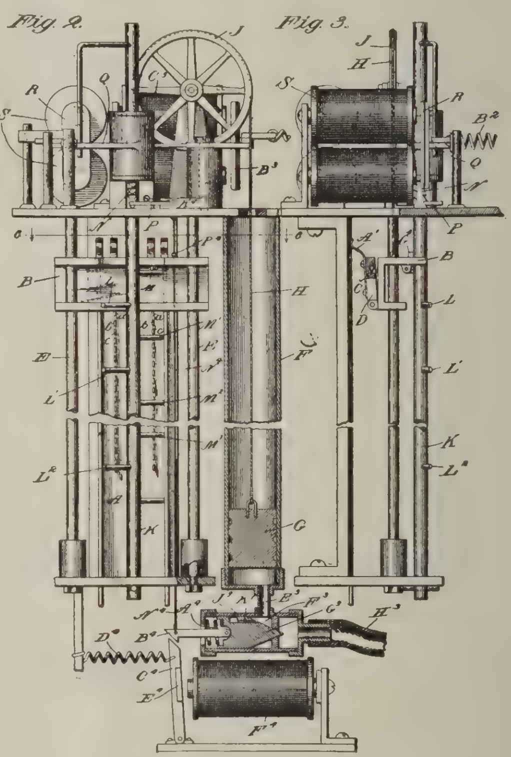


Fig. 2. Fig. 3.



IMPROVED SELF INDUCTION COIL.

George A. Campbell, of Newton, Mass., patents (No. 737,703) an improved self induction coil, and Messrs. George A. Campbell and Wilton L. Richards, of Malden, Mass., patent (No. 737,704) and assign to The American Telephone and Telegraph Company an improved induction coil. Both of these patents are granted for essentially the same device. No. 737,703 is shown in Fig. 1. The object of the invention is to provide such a surrounding of iron as shall prevent cross talk or other inductive disturbances between adjacent coils. In the illustration S is the coil proper, which is placed within a circular wooden box *a*. Around the circumference of this box are holes *h*, *h*, and *h*, which are filled with bundles of iron wire, which form a magnetic protection for the coil. The patent No. 737,704 has the same object in view, and merely covers a different arrangement of the shielded iron wire. It is shown in Fig. 2, which illustrates the coil protected by a series of iron wire ropes or strands, which are threaded through it, as is shown in the illustration.

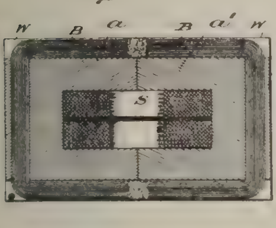


Fig. 1.

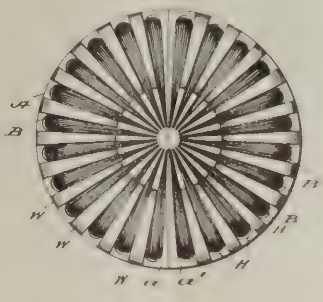


Fig. 2.

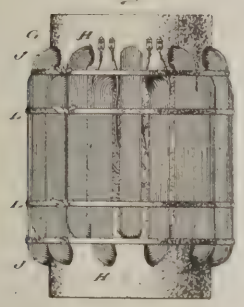


Fig. 2

TELEPHONE TEST INSTRUMENT.

Henry G. Chalkley, patents (No. 737,345) an improved telephone test instrument. The object of this invention is to provide a combined transmitter and receiver chiefly for the use of linemen and those to whom a very small and portable instrument is essential. It is illustrated in Figs. 1 and 2. From the section of the instrument in Fig. 2 it will be perceived that there is a transmitter composed of the diaphragm *27*, the carbon button *23*, and the mouthpiece *13*, behind which a receiver, composed of the magnet *16*, and the spools *18*, and the diaphragm *19*, is placed. From the receiver an acoustic tube *3*, supplied with an ear-piece *4*, extends, thus there is combined transmitter and receiver in a single piece of apparatus.

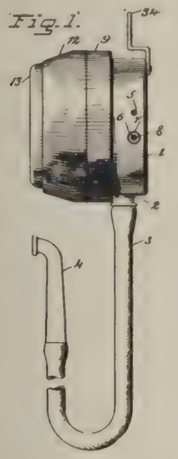


Fig. 1.

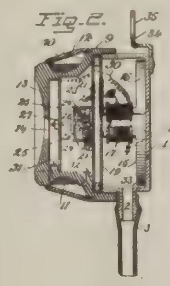


Fig. 2.

IMPROVED AUDOPHONE.

Miller R. Hutchinson, of Upper Montclair, N. J., patents (No 737,242) and assigns to the Hutchinson Acoustic Company of New Jersey a telephonic apparatus intended to be used by persons of impaired hearing. The object of this invention is to provide a device for all those whose hearing is affected in order to enable them to enjoy concerts, theatrical entertainments, etc. This invention is shown in Fig. 2. It consists of a case *b*, having a transmitter *T*, a receiver *R*, and prepared batteries *g*. The sides of the case *a* and *a'* are movable on hinges, and are used as sound reflectors. Two funnels, *i* and *i'*, are placed opposite these reflectors and in connection with the transmitter. The wings *a* and *a'*, are opened and the case directed towards the source of sound, thus the effect of the transmitter is proportionately augmented, and by using the receiver those with impaired hearing can enjoy public performances.

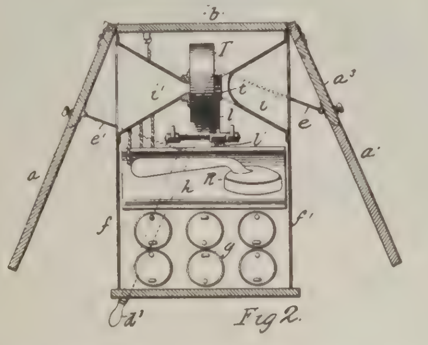


Fig 2.

LINE INSULATOR.

William G. Rutledge, of Brown Valley, Minn., patents (No. 737,027) an improved insulator. The object of this invention is to provide an insulator for lines that is capable of automatically securing the line wire, and barring the use of the present tie wire. This invention is shown in Figs. 1 and 2, from which it is perceived that the insulator has a slot *b*, in its top that is carried diagonally half-way around it. By pulling in the slack of the wire, it can be dropped into the slot, when it will straighten itself.

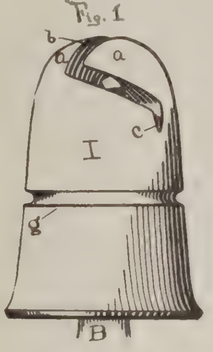


Fig. 1

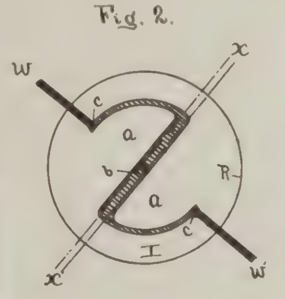
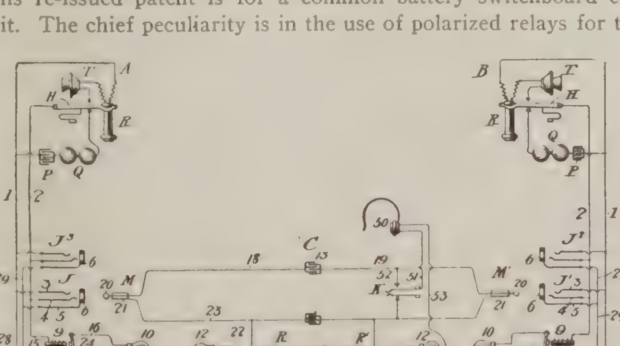


Fig. 2.

SWITCHBOARD CIRCUIT.

J. W. Lattig and Chas. L. Goodrum are granted a re-issue (No. 12,156) on a patent previously given to them (No. 722,367). This re-issued patent is for a common battery switchboard circuit. The chief peculiarity is in the use of polarized relays for the supervisories signals. The original patent was issued on March 10th of this year, and was fully described in our issue of that date. The re-issued patent is shown in Fig. 1, but does not differ essentially from the original grant.



The Week's Messages.

FINANCIAL

INDIANAPOLIS, Ind.—The Varney Electrical Supply Company has issued $30,000 of preferred stock in accordance with a recent resolution of the directors.

DUBUQUE, IA.—The Interstate Telephone Company held its annual meeting in Dubuque. A dividend of 12 per cent. was declared and the capital stock, formerly $100,000, was increased to $150,000. The company intends to make improvements and extensions during the coming year and largely increase its facilities. The election of officers for the ensuing year resulted as follows: President, Vic Stevens, Dubuque; vice-president, R. W. Gadsden, Dyersville; secretary and treasurer, Charles Loxan, Earlville; directors, J. J. Kann, Elkader; J. H. Denkhoff, Dyersville; J. M. Dunn, Earlville.

LYNDONVILLE, N. Y.—The Lakeside Home Telephone Company, of Lyndonville, has given a mortgage to the Rochester Trust and Safe Company for the sum of $40,000. The mortgage has been filed with County Clerk Stocum and covers all the property of the telephone company and enable them to go ahead with the construction of new lines in Orleans County.

KIRKWOOD, PA.—At a recent meeting of the directors and stockholders of the Southern Telephone and Telegraph Company, held at Kirkwood, it was voted to increase the capital stock to $35,000, and also issue 5 per cent. bonds to the amount of $10,000. This increase of capital is made necessary by the rapid growth of the system.

GERMANTOWN, TEXAS.—The Germantown Independent Telephone Company has increased its capital from $2,500 to $10,000.

SPOKANE, WASH.—Notice of increase of the capital stock of the Interstate Telephone Company has been filed in the office of the county auditor. The company was organized with a capital stock of $20,000. At a recent meeting of the stockholders it was decided to increase the capital stock to $100,000. The officers of the company are: Moses A. Phelps, president, and Frederick W. Haverland, secretary.

FRANCHISES

WABASH, IND.—The franchise of the Central Union Telephone Company in this city has expired and no renewal has been asked.

VALLEY JUNCTION, IA.—A special election will be called by the town council to vote on the franchise for the Grimes' Farmers' Mutual Telephone Company, of Grimes, which desires to bring wires into the Valley.

ONAGA, KAN.—A franchise has been granted to R. G. Guffy and H. H. Benton for a second telephone exchange here. The Independent company, now here, has about one hundred subscribers. Several farmer lines will be built at once in addition to the town lines by the Vermillion Valley Telephone Company.

AUBURN, ME.—The Auburn city government has voted to let the Northeastern Telephone Company into the city.

NORTH ADAMS, MASS.—A director of the Berkshire Telephone and Telegraph Company, which proposes to make an entry into this city, Pittsfield and other places in this county and vicinity as an Independent telephone company, has received a letter recently from Mr. Davis, the promoter of the company, saying that it is confidently expected to begin work in this city this fall. It is understood that the company will make application for a franchise in North Adams within a few weeks.

NEWARK, N. J.—The Central New Jersey Telephone Company has applied to the Springfield Township Committee for a franchise to operate a telephone line in that place in opposition to the Bell Telephone Company. Similar applications have been made in the counties of Union, Morris, Hunterdon and Middlesex.

PATCHOGUE, N. Y. The Suffolk County Telephone Company, composed principally of Patchogue stockholders, has been granted a franchise by the village trustees to erect their poles within the village limits.

GREENSBURG, PA.—The Pittsburg-Johnstown Long Distance Telepone Company has asked the borough council for a franchise.

PARKER, S. D.—J. A. Steninger has secured a franchise to erect a telephone line in Monroe. It will be connected with the Parker system by a rural line.

DALLAS, TEXAS.—A second application for an independent telephone franchise in Dallas has been sent to the city council and commission by W. H. McGrath as the representative of Joseph D. Lloyd and associates.

ELECTIONS

KANKAKEE, ILL.—At a meeting of the stockholders of the Eastern Illinois Independent Telephone Company the following directors were chosen: C. M. McLaughlin, I. W. Gotshall, Thos. Legois, A. J. Vernier, Geo. H. Probeck, L. D. Gotshall, William Fraser, Louis E. Beckman, Charles N. King, William H. Radeke and J. Frank Leonard. The following officers were elected by the new board of directors: President, J. Frank Leonard; vice-president, William Fraser; secretary, William Radeke; financial secretary, Anatole J. Drolet; treasurer, Thos. A. Legris.

BOONE, IA.—The board of directors of the Boone County Telephone Company has elected F. H. Jones manager to succeed F. Cleaver, who recently resigned.

HUNTINGTON, MASS.—The Huntington Telephone Company held a meeting recently and elected Captain Wm. Card vice-president of the company. The work of setting poles and stringing wires will be commenced at once. President Bartlett states that the work of construction will be pushed as rapidly as possible.

MANKATO, MINN.—The Minnesota Valley Telephone and Telegraph Company, at a recent meeting, re-elected the directors as follows: J. H. James, H. A. Patterson, F. M. Currier, I. D. Webster, W. N. Plymat, W. D. Willard, J. B. Meagher and E. H. Moulton. Mr. Moulton was elected president, Mr. Patterson vice-president and Mr. Willard secretary and treasurer. The poles for the new toll line that the company is building towards Worthington have been set as far as St. James. Connections will soon be made with the Independent exchanges at St. James and Madelia.

UPPER SANDUSKY, OHIO.—The Upper Sandusky Telephone Company elected the following officers at the annual meeting: President, G. W. Hale; vice-president, D. L. Ingard; secretary, M. H. Brinkerhoff; treasurer, J. J. Hulse; manager, C. D. Juvinal. The above officers, together with T. E. Beery, W. A. Gibson, H. H. Newell and Annie E. Osborn, form the board of directors.

COMBINATIONS

DETROIT, MICH.—It has been announced that the plant of the People's Telephone Company, representing an investment of approximately $400,000, has been sold to a syndicate associated with the Stromberg-Carlson Telephone Manufacturing Company. The new organization embraces six prominent men in other cities as follows: Eugene H. Satterlee, president of the Rochester Home Telephone Company, Rochester, N. Y.; Thomas W. Finucane, general manager of the Stromberg-Carlson Telephone Manufacturing Company; Alfred Stromberg, president of the Stromberg-Carlson Telephone Manufacturing Company, of Chicago; Arnold Kalman, capitalist, of St. Paul, Minn., and John J. Heim, president of the Kansas City Home Telephone Company, of Kansas City, Mo. The company has petitioned the Common Council for a new franchise for the purpose of operating its lines in the city and connecting with other Independent telephone lines throughout the State.

WHITEVILLE, N. C.—The Columbus Telephone Line of this place has been sold for a second time at public auction, under an order of court, by C. D. Weeks, receiver. The line was bid in by B. G. Empie, as attorney for other parties, for $2,500, which is $1,400 less than the property sold for in Whiteville last July.

WEST UNION, O.—Messrs. Mann, of Indianapolis, and Miller, of Winchester, representing the Acme Telephone Company, have purchased the Central Union Company's lines and outfit. Mr. Miller will assume management of the new system. Extensive improvements will be made, including a new line to Winchester via Unity.

THE WEEK'S MESSAGES—Continued

UNDERGROUND

TAUNTON, MASS.—The Massachusetts Telephone Company has asked permission to construct and maintain conduits on Central street, City Square and Johnson's lane; also for poles and wires on Jenny Lind street.

ST. LOUIS, MO.—Officials of the Bell Telephone Company of Missouri estimate that more than $700,000 will be expended for improvements in and around St. Louis during the year 1903. In the city the 17,000 feet of conduits which were built last year are now being cabled, which work will be completed in a short time. The Company will then have over 1,500,000 feet of underground conduits in St. Louis.

OKLAHOMA CITY, O. T.—J. W. Wilson, manager of the Missouri-Kansas Telephone Company's lines in Oklahoma, has returned from Kansas City, and announces that an appropriation of $40,000 has been made for a conduit system in this city.

GLEN COVE, N. Y.—The New York and New Jersey Telephone Company has been granted a franchise to lay subways from the city line along the Hempstead turnpike to Hempstead, and thence along the Central turnpike to Farmingdale.

CHAMBERSBURG, PA.—The United Telephone and Telegraph Company will lay a system of underground conduits in Chambersburg.

INDIANA, PA.—The Indiana Telephone Company is constructing its underground conduits in Carpenter avenue. All wires will be put underground. The Farmers' Telephone Company also expects to put its wires underground on Carpenter avenue.

MISCELLANEOUS

BEAVER CROSSING, NEB.—The Seward County Telephone Company, with headquarters here, which was recently incorporated with a capital stock of $50,000, is now connected with about twenty different towns in five counties, and has its system in operation with over sixty-seven subscribers. The officers are Dr. Doty, president; Henry Wellman, vice-president; J. H. Ritchie, secretary and treasurer.

PERSONAL

M. A. CHARLTON will probably succeed M. E. Taylor as manager of the Home Telephone Company, of Galion, Ohio.

FRED D. CLEAVER, manager of the Boone County Telephone Company, at Boone, Ia., has resigned his position and has gone to Dubuque. He has accepted a position with the Bell Company. Mr. Cleaver succeeded C. C. Deering as manager of this office when Mr. Deering went to Des Moines. As yet his successor has not been announced but several men are being talked of, F. H. Jones, of Iowa City, being considered in a favorable light.

JOHN A. CULLEN, of Richmond, Va., has been sent to Birmingham, Ala., by the Southern Bell Telephone Company to take charge of the traffic department of that company there.

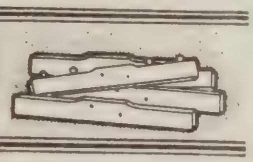
C. L. CUMMINGS, assistant superintendent of the Mansfield, Ohio, Telephone Company, tendered his resignation to accept a position with the Mexican Electrical Construction and Supply Company.

A. H. ELMORE, of Syracuse, N. Y., has accepted the position of general superintendent of the Glen Telephone Company, at Gloversville, N. Y., which position was made vacant by the death of Milton Diefendorf.

W. S. HARRISON, the new manager of the Independent Telephone Company, at Arkansas City, Kas., has arrived from Waterloo, Iowa, to take charge of the position vacated by Mr. Cooper, who goes to Guthrie.

A. D. WICKHAM has been promoted to superintendent of equipment of the Utica Home Telephone Company.

New Construction in the Field



FLORA, ILL.—The Friend Independent Telephone Company, of Flora, is cabling its lines and making other improvements. Several farmers' lines will be built near Flora.

XENIA, ILL.—The Daniels Telephone Company has a line in process of construction from Xenia to Oskaloosa.

ECONOMY, IND.—The Modoc Telephone Company has established an exchange at Economy and is ready to begin business.

LOUISVILLE, KY.—The Home Telephone Company is to open in Charlestown, and preparations are being made to start an exchange in that place.

SERGENT, KY.—County Court Clerk John W. Collins and Attorney Ira Fields, of Whitesburg, have received the contract to build the telephone line from Whitesburg to Stonega, Va., over Cumberland and Black mountains, a distance of twenty miles. Later the line will be extended to Mayking.

NEW BEDFORD, MASS.—The Automatic Telephone Company, of New Bedford, has recently completed a toll line connecting with the Fall River Automatic Exchange, which has 1,200 subscribers. The lines are said to be kept very busy and to bring in a good revenue. The Automatic Company has about 800 subscribers, with rates of $24 and $36. The officers are F. T. Akin, president; L. B. Bates, vice-president; Frederick Taber, treasurer; A. E. Perry, clerk.

ANN ARBOR, MICH.—At a meeting of the Board of Directors of the Washtenaw Home Telephone Company, of Ann Arbor, the contract for the outside construction work was awarded to the firm of Jones & Winter, of Chicago. The contract involves $175,000. The Ann Arbor Company is composed of Wilkes-Barre, Pa., and Hazleton, Pa., capitalists.

VIDETTE, HOMER, MICH.—The Woodbury Telephone Company, of Homer, is planning great improvements in their system for the coming year.

RED WING, MIN. At a council meeting a resolution was passed granting H. M. Scoville permission to extend his telephone system.

MESABA, MINN.—Nashwauk, the new town, on the Mesaba range, is soon to be connected with the outside world by telephone by the Mesaba Telephone Company, which will make an extension from Hibbing.

OCEAN SPRINGS, MISS.—A telephone system has been completed between this place and Vancleave. Messrs. L. A. Lundy and F. H. Russell, of Ocean Springs, and S. J. Anderson, of Vancleave, are the owners of the line.

CARROLLTON, MO.—The Missouri Valley Telephone Company is extending its line to Excelsior Springs and if the Independent line from Kansas City does not meet it there it will be extended into Kansas City.

BELVIDERE, N. J.—The West Jersey Toll Line Company—under which the Belvidere telephone system is operated—has commenced rebuilding its line—a contract having been entered into to bring the existing lines up to the standard and for extending it in various directions.

PEEKSKILL, N. Y.—L. W. Reynolds, special agent of the State Line Construction Company, was in town making the preliminary arrangements for constructing a telephone system throughout Dutchess county.

W. WHITEFIELD, N. Y.—Manager F. C. Ward, of the telephone exchange in Richfield Springs, and Hon. Myron A. McKee, of that place, were in W. Whitefield recently securing a franchise for a line from Richfield Springs to Cassville and so on to Utica via Home Telephone Company's line.

RUTHERFORDTON, N. C.—Thos. C. Mills, president of the Polk County Telephone Company, was here recently to take Manager Poe Eskridge to Polk county for the purpose of looking over the field between Columbus and Mill Spring, and Mill Spring and Rutherfordton, to ascertain the cost of building new lines between these places. While in Polk Manager Eskridge will do some repair work for the telephone company there.

ORRVILLE, O.—The Millersburg, Wooster & Orrville Telephone Company are completely rebuilding their plant here. They are replacing about 100 poles with new ones, and will put up 9,000 feet of cable, which will do away with a large amount of wire on the poles.

SPRINGFIELD, O.—The contract for installing a telephone system in the new county building has been awarded to Byron Clingerman.

WAPAKONETA, O.—The Wapakoneta Telephone Company is making arrangements to enlarge the local plant, and during the week will place a new switchboard with 100 new telephones.

BEECHWOOD, PA.—The Beechwood Telephone Company is constructing its system.

WASHINGTON, PA.—The Federal Telephone Company is securing rights of way from Waynesburg by way of Graysville, Burdette and Burnsville, for a line to Dallas, W. Va., to meet a line already constructed from that place to Wheeling.

BRISTOL, TENN.—Manager A. Parlett, of the Bristol Telephone Company is completely rebuilding its plant here. It is replacing about council of Johnson City, relative to improving the service.

HOUSTON, TEX.—The Commercial Telephone Company of Houston is building a line between Carmine and LaGrange. There is also talk of building a line between LaGrange and Brenham to pass through Rutersville, Warrenton and Round Top.

PETERSBURG, VA.—The Petersburg Telephone Company has purchased a storehouse. As soon as a lease expires the telephone company will occupy the building.

WATERVILLE, WASH.—Messrs. McCollum, Hill & Co. have installed another rural telephone line in the Douglas dsitrict.

TRADE NOTES

THE FRANCIS BEIDLER COMPANY, of 429 W. 22nd Street, Chicago, Ill., recently made a large shipment of Idaho and Michigan cedar poles to the Independent Construction Company, of Kankakee, Ill., with which it has a contract. The Home Telephone and Telegraph Company, of Fort Wayne, Ind., has also made some extensive purchases from this company.

THE MALTBY LUMBER CO., of Bay City, Michigan, cedar dealers, has issued a booklet called MICHIGAN WHITE CEDAR, and is sending it to all of its customers. It is a Story in Two Chapters. There is considerable information and some rather instructive pictures contained in the folder, which the company will be glad to send to any telephone man.

THE CENTRAL TELEPHONE AND ELECTRIC COMPANY, of 909 Market street, St. Louis, Mo., has issued a circular describing Becker Protectors and the Gilgen Patent Fuse. The company claims that the line of protectors that it manufactures will cover all requirements of telephone systems and will give the user practically perfect protection at all points with minimum expense. Protectors are described which are fitted for service on distributing boards and cross connecting boards. The Becker terminal and cable heads are also described. The Gilgen Patent Fuse is constructed so as to have 6 inches of fuse wire and 8 saw-tooth points within 1/32 inch of the ground plate. This, it is claimed, gives all the advantages possessed by carbon arresters without the continual attention required by them to prevent grounding lines. The fuse is made of a special metal which has a constant fusing current capacity. That is, as it grows old it does not take more current to fuse it. Prices are given on the apparatus described.

THE ILLINOIS ELECTRIC SPECIALTY COMPANY, of 171-173 South Canal street, Chicago, Ill., is manufacturing a pole changer the many advantageous features of which will appeal to telephone men. The instrument is extremely simple, rigid and compact in its construction. Its mechanism is mounted on an oak base covered by a neat oak-hinged box beveled plate-glass front, and complete instrument measures only 9 x 6 x 5 inches, and weighs but five pounds. It is so constructed that it will work in either a horizontal or vertical position, thus admitting of it being mounted on cabinet, hung on wall, or any other convenient place. It is practically noiseless, and, therefore, not objectionable in the operating room.

The machine has but three contact springs, which are made of German silver, and have contact points of heavy sheet platinum. The contact springs engage alternately from their opposite sides and consequently cannot be forced out of their normal position by extended use. As the whole mechanism is securely mounted and locked in one solid heavy brass frame, it is quite impossible for any parts to get out of adjustment, and, therefore, never requires adjusting after leaving factory, except for regulating speed, which is done by simply sliding a small ball on end of vibrator rod. It is adapted to use where either or both alternating and pulsating currents are required, and especially to meet the requirements of heavily-loaded party and long toll lines. A condenser is mounted in base of machine and is permanently bridged across the ringing circuit which entirely controls, on common return systems, what is known as "generator noise," and also reduces to a minimum sparking at the contact points. A resistance coil is also placed in the battery circuit to prevent any injury to machine by an excessive flow of current in case of accidental short circuits. There is absolutely no consumption of main battery current, only when operator presses ringing key, thus reducing cost of maintenance which consists only of battery renewals.

The company manufactures four different styles of the instrument. No. 1 Style, consists of pole changer and one closed circuit Edison type R. R. cell for operating vibrator. No. 2 Style, consists of No. 1 outfit mounted in oak-paneled front cabinet, measuring 20 inches high, 13 inches wide, 9½ inches deep. No. 3 Style, consists of No. 1 outfit and 56 Columbia dry batteries, all mounted and connected up in an oak-paneled front cabinet with three shelves, and measuring 29 inches high, 22 inches wide, and 12½ inches deep. The 56 dry batteries are mounted on lower and middle shelves, each holding 28, and the Edison on the top shelf, on which is left sufficient space for 19 reserve dry batteries, should they ever be required. All the shelves are removable by sliding, thus rendering access easy for inspection. The cabinet is equipped with plug switch for cutting in and out the dry batteries which are divided up in sets of 28, 42, 56, also 75 if the reserve batteries are used. The 19 reserve dry batteries are not furnished except when ordered extra, and are charged at 18 cents each. No. 4 Style, is same as number 3 except without the dry batteries. The cabinet, however, is wired complete and tagged ready for connection.

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NEW YORK, 116 NASSAU ST. **CHICAGO, MONADNOCK BLDG.**

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VOLUME VIII *SATURDAY, SEPTEMBER 26, 1903* *NUMBER 13*

SOME TELEPHONIC REMINISCENCES

By Clarence Field.

IT is rightly expected that the great exposition which is to be held in St. Louis next summer will be the largest and greatest exhibition that the world has ever seen. Certainly its electrical features will surpass anything that have previously been witnessed, partly because the management, under Professor Goldsborough, is giving greater attention to electrical exhibits than heretofore, and partly because electricity as one of the youngest sciences, is developing with the utmost rapidity. So it is not amiss to glance backward a moment at the part which St. Louis has played in the evolution of the telephonic branch of the electrical science.

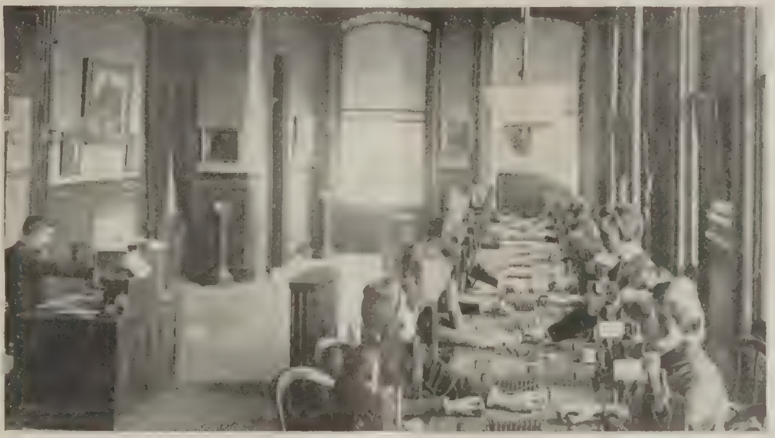


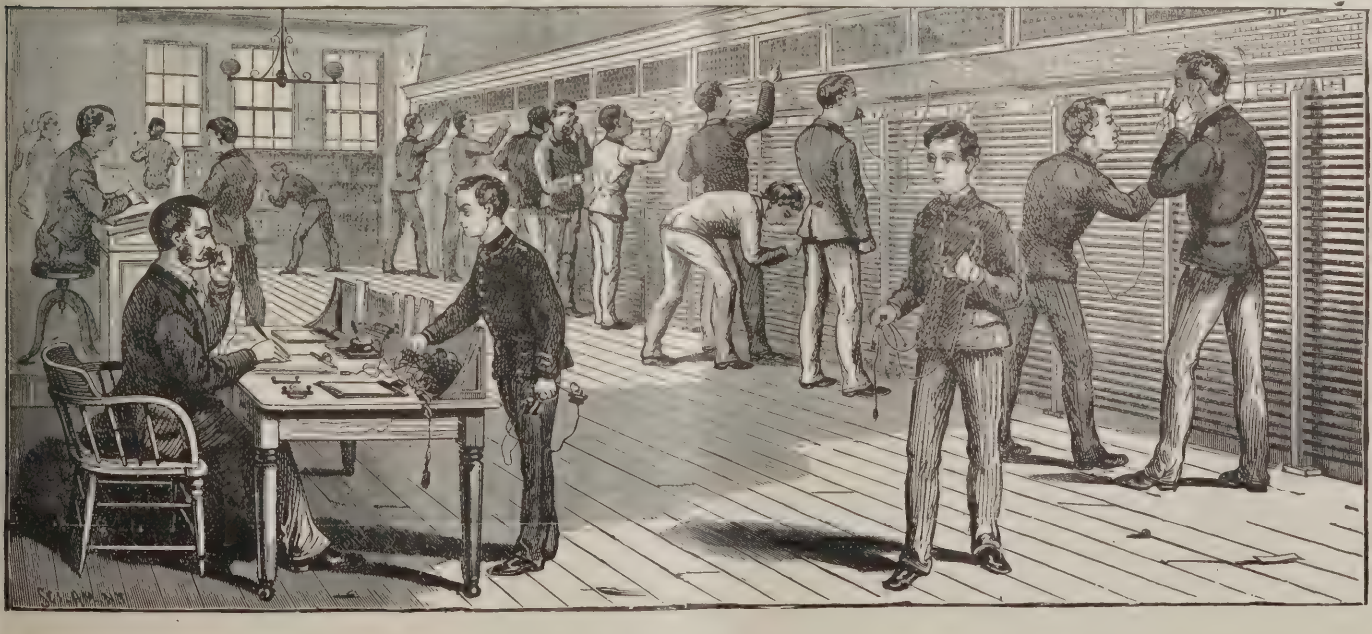
Fig. 1. The 'Law" Switchboard in the St. Louis Exchange.

It is interesting to note that one of the first, and perhaps the largest of the early telephone exchanges, was opened in St. Louis May 1st, 1878. Then the telephone was barely two years old, and its developments had been almost exclusively confined to short lines between private individuals. With fortunate foresight, the builders of the new plant had early perceived the possibilities that lay in the new method of intercommunication, and with the courage of the pioneer had conceived and endeavored to build a system far more comprehensive than anything at that time in existence.

The opposition that the establishment of a telephone exchange encountered may be pictured in the answer which a well-known capitalist gave when asked to subscribe. "There are plenty of A. D. T. boys, and nobody will use a telephone even if they have one." In spite of such incredible shortsightedness, the organizers finally succeeded in interesting a number of prominent St. Louis citizens in the enterprise, the outcome of which was the stringing of about 75 miles of wire throughout the busiest part of the city from the river to 20th street, and from Chateau to Cass avenue.

The early switchboard is shown in Fig. 3, and occupied a single

Fig. 2. Old Wood Cut Showing a Scene in an Early Telephone Exchange.



small room, furnishing employment to one operator. The various lines entered by the roof of the building and converged to a kind of a desk seen at the left hand of the illustration. Surrounding this a number of telephones were placed upon a kind of a rack or frame work. Upon each of which annunciators, exactly resembling those seen in hotels, were placed. When a subscriber signaled, the shutter of one of these annunciators fell. The operator inserted into a metal strip placed near the annunciator a plug which connected a telephone line with the line of the annunciator indicating a call and then proceeded to take the instructions given by the subscriber. In the early days no ladies were employed, the service being maintained entirely by boys. There was no cord shelf and no arrangement of listening and ringing keys, but each boy was furnished with a number of cords and plugs connected to telephones which he carried about his neck.

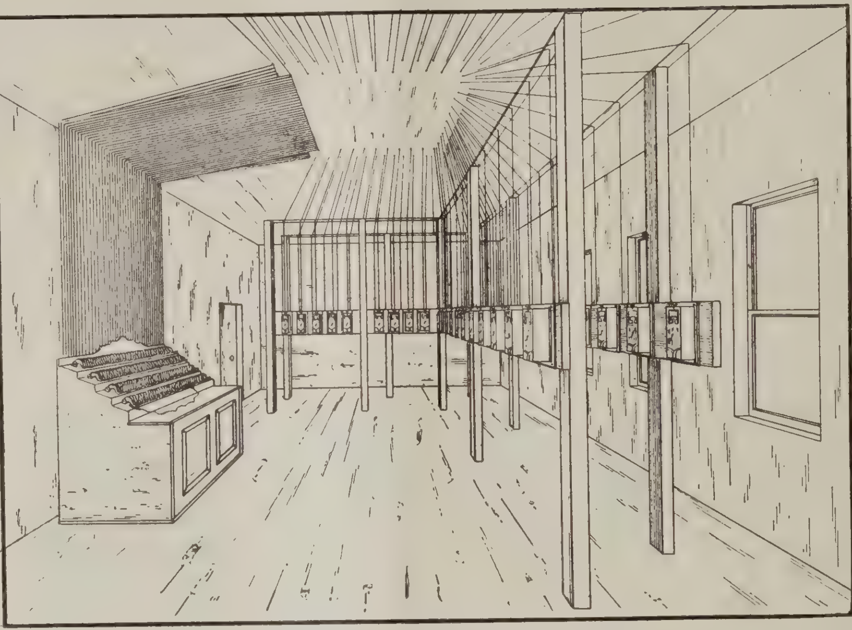


Fig. 3. First Telephone Exchange in St. Louis.

Fig. 2 is a scene taken from an old scientific paper, in an early exchange of this kind, in which the various boys will be seen running about the floor endeavoring to keep track of the falling shutters of the annunciators. There was even no call bell in the exchange, and the only notice that a subscriber could give was the click made by the dropping of the shutter of the annunciator. Naturally, many signals remained unanswered for long periods of time, and the annoyance and discomfort to which the subscribers were subjected is hard to imagine in these days of improved methods and training when operators answer within two or three seconds.

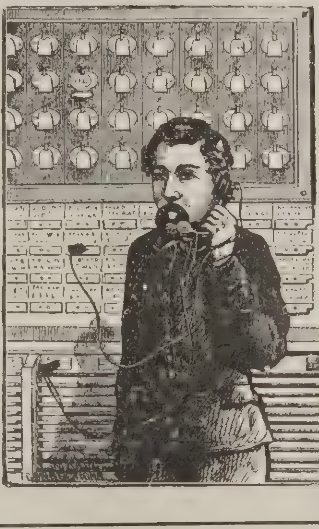


Fig. 4. Old Style of Switchboard.

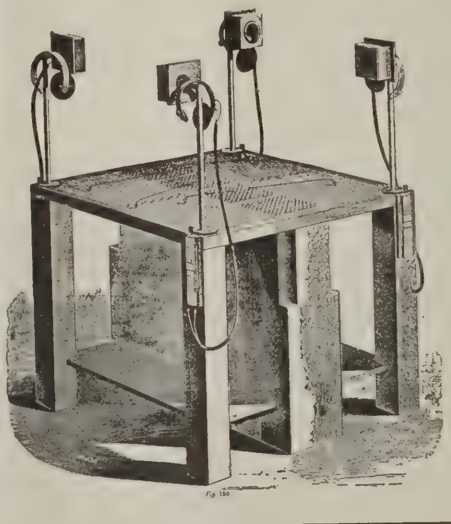


Fig. 5. One Section of Old Law Switchboard.

The detail method then employed to answer a call is interesting in contrast with that in use at present. Two boys were employed to watch the annunciators, and when a click was heard one would locate the fallen shutter. The boy would then go to the telephone on the rack that was connected with the same line and insert the plug of one of the instruments hanging around his neck and ask the subscriber for the number desired. On receiving the order number the boy would call to the operator at the switchboard the number of the party calling and the number called for. The operator would then connect these two lines by means of a couple of plugs joined by wire.

There was an equal difficulty in making disconnections, for there were no clearing out signals, and in order to find whether a subscriber had stopped conversation it was necessary to withdraw the plug from his line and insert another plug carrying a telephone and listen. As a result, interruptions to conversation were most frequent, and also great delay was experienced by subscribers who desired another connection. Fig. 4 shows the elevation of a switchboard of the pattern used in the early St. Louis exchange, in which the annunciators are contained in the panel at the top of the board, while beneath it are a number of plates, each having a hole into which a telephone plug could be inserted to connect with the line. Such a system was susceptible of, and necessarily received very rapid modification and improvement.

Five or six years later the telephonic art had so far improved as to require the entire rebuilding of the St. Louis plant. At this time what was known as the Law System was adopted, and installed in St. Louis. This was one of the largest and most successful developments of this method of operating. The general view of the operating room in St. Louis in which the Law board was installed is shown in Fig. 1, while a detailed view of a single table is given in Fig. 5. This switchboard consisted of a rectangular table about six feet square, in the center of which there was a panel, upon which rested a number of plugs connected to cords passed through holes in the panel. Each cord was armed with a weight and a spring, which made a sliding contact with a metal tube, into which the cord extended and to which the line was attached. Every subscriber's line which ran to one section terminated in one of these tubes. Surrounding the middle panel were strips containing spring jacks, a jack being furnished for every line in the exchange, very much after the fashion of the present multiple board.

The peculiar feature of the Law system was, however, the absence of all forms of signaling apparatus in the exchange. The subscribers were divided into groups, and to each subscriber in a group a special wire was connected that ended in a head telephone that was worn upon the operator's ear. By pressing a button in the substation set the subscriber could speak directly to the operator. It was therefore entirely unnecessary to provide any annunciators, lamps or other forms of signaling, for when a subscriber desired to call, he could, by a touch of the button, speak to the operator instantly and ask for the party required. The method of operating was something as follows: Upon touching the button the subscriber would say, for example, 257 wants 863, the operator would know that 257 was calling and desired a connection with 863. If another party was using the order wire at the same time, the subscriber desiring to call would hear the voice of the other party the moment that he touched the order wire button, and under such circumstances was expected to wait until the wire was clear.

In the Law board it was often customary to place four operators at each table, and thus the panel was made large enough so that each one could readily reach the center and pick out any one of the desired cords. Four telephones were supplied, each one of which was supported upon a post placed at the corner of the table. So successful was this form of central office that it remained in active operation until 1898, and was then replaced by one of the modern relay switchboards. At this time the exchange had between four and five thousand subscribers, and it speaks well for early electricians that they were able to devise apparatus apparently so crude, yet which was capable of handling an exchange of such magnitude.

The Law system was operated entirely on grounded circuits. In those days telephone conduits were unknown, and all lines were carried aerially, partly upon pole lines and partly on house top fixtures.

A slight idea of the fearful complexity thus entailed can be gained by conceiving a mass of from four to five thousand wires converging upon top of a single building and entering its roof. With every sleet storm hundreds of wires were broken, and in endeavoring to repair such damage, the linemen inadvertantly interrupted hundreds more.

Where pole lines were adopted the principal thoroughfares became so cluttered with circuits as to appreciably obscure the light. From the middle of the last decade the impracticability of continuing such a state of affairs became well recognized, and steps were taken to re-build the entire St. Louis plant. Throughout the downtown district an extensive conduit system has been installed in which all existing lines are placed in cable, so that the only aerial work in St. Louis is in the alleys and on the outskirts of the city.

In the early 90s St. Louis, following the progressive telephone policy that she has always exhibited perceived the advantages of telephonic competition, and as a result the Kinloch Telephone Company was established as an Independent corporation. The exchange which was constructed was at that time the largest and best of the Independent telephone plants. A divided multiple switchboard, having an installed capacity of about five thousand lines was erected. With commendable foresight the Kinloch Telephone Company introduced the most complete underground system throughout the greater portion of the city, using open wire only in the alleys for the purpose of distribution. From a telephonic standpoint it is easy to see that St. Louis has always adopted an exceedingly progressive policy, and there is little doubt that visitors to the Louisiana Purchase Exposition of next summer will be supplied with the best telephonic facilities that are known.

CONTEMPORARY CROSS TALK

By "The Listening Key."

IF it be granted that the distribution of traffic is one of the problems of the future it must also be granted that it can only be effected by passing each call through two operators; that is, unless an automatic method of distributing calls can be devised. Off hand this does not look like an easy matter. A machine that would automatically, when the traffic was very slack, concentrate all the calls at one position and then gradually carry them over two, three or more in accordance with the rise in the tide of traffic, would be a very valuable machine. But the apparatus of a central telephone exchange is already sufficiently complicated and the advent of such a machine in practical workable shape is hardly to be looked for just yet. With the means we now have at hand it must be taken for granted that in order to distribute the traffic effectively, every call must be handled by two operators. At first sight this looks like a step backward in economy of operating, for if many calls are now handled by only one operator it would apparently cost more to pass every call through the hands of two operators. That depends. If the amount of work done by each operator on each call were the same in both cases it would clearly cost more to put all calls through two operators. But if the amount of work done by each operator on each call were much less on the divided plan, then the cost for operators' wages of handling each call might be actually reduced.

A Simple Example

FOR example, let us assume that each subscriber operator's position now handles a thousands calls a day, and for the sake of a perfectly clear, plain and straightforward example, let us assume that we have a system of only one exchange, so that all calls are completed by only one operator. If now we substitute a divided board for the multiple board it is clear that each operator's position would then have to handle two thousand calls a day for the expense per call for operator's wages to remain the same. If you pass each call through the hands of two operators instead of one only you must get each operator to handle twice as many calls as she did before for the operating expenses per call to remain the same. And it is conceivable that that could be done. If the work now done by a subscriber operator on completing a connection could be accurately divided between two operators so that each of the two would do just half of what the one now does, the problem would be simple. But in the divided working there must be a certain amount of overlapping and duplication of work, and this has to be compensated for to bring us out even. It will be compensated for in several ways. In the first place by the greater uniformity and greater concentration of the work, in the second by the more even flow of work, and in the third by special devices to render quick and accurate the transfer of calls from one operator to another.

Tempered by Actual Conditions

WE have not, however, quite such a difficult problem to consider as the conversion of a single exchange multiple system to a divided system. The actual conditions that we have been considering give the divided system rather a more favorable chance, because they are conditions under which a great part of the work is already done by two operators. In a system where a large part of the traffic is trunked from one exchange to another the greater proportion of the traffic is already passed through the hands of two operators and the question is whether economics and improvements will not be introduced by passing *all* the traffic through the hands of two operators. Assume, for example, that we have got up, on a system containing several exchanges, to a percentage of trunking of 80. That means that all the calls pass through the hands of one operator and that 80 out of every hundred pass through the hands of two operators. The first operator, the answering operator, handles, say, 1,000 calls a day. The second operator, the trunking operator, by reason of the more steady flow of her work and of its greater simplicity, handles a larger number of calls a day, say, from 1,600 to 2,000. If then, by so arranging the apparatus as to give the answering operator a steadier flow of traffic and a greater simplicity of operation, we can enable the answering operator also to handle 1,600 to 2,000 calls a day, we should effect an actual economy by passing all the traffic through the hands of two operators. And at the same time, as already hinted in some previous notes, we should effect an improvement in the service by a more even distribution of the traffic.

Illustrated Arithmetically

A SIMPLE arithmetical calculation shows that on the above figures, three operators, on the average, are employed for every two thousand calls. For 2,000 originating calls two answering operators are employed and as eighty per cent. of these two thousand originating calls are trunked a third operator, a trunking operator, is employed to complete the 1,600 trunked calls that result from the 2,000 originating calls. If we so arrange matters on the divided plan that each operator, the answering operator and the trunking operator, handles 1,600 calls, we have a distinct gain. Then two operators will be handling 1,600 originating calls instead of 3 operators handling 2,000, and a simple rule of three shows that the saving is half an operator on every 2,000 calls. In the one case we have for 100,000 calls 150 operators, and in the other we have only 125, a clear saving of 25 operators. At an average pay of $6 a week this would be an annual saving of $7,800. If by the divided system the two operators could be given a capacity to make a greater number of connections in the course of a day than 1,600 each, the saving would be proportionately greater. And the higher the average rate of operator's pay, the greater, obviously becomes the saving.

Can We Get a Saving?

THE vital question is, can we, on the divided plan, give the answering operator a sufficiently greater amount of work in a day to effect any saving at all, and how are we going to do it? It will hardly be disputed that a point will come in the traffic of systems containing several exchanges where it will be economical to do away with the multiple jacks at the answering positions and trunk all the traffic. Even if no gain could be made in the actual expense for operators' wages for handling a given amount of traffic, but it were necessary on the contrary to put in extra trunking operators' positions, there would still certainly come a point where it would be economical to abolish the multiple jacks from the answering positions. But we have carried the thesis a bit further than this and put forward the proposition that by the divided plan we shall obtain a better distribution of the traffic among the operators and so effect, in spite of having two operators in on every connection, an actual economy in operating expense per connection. Now, how are we going to do this? It is a question that American Telephone Journal readers may well think over for themselves, for necessarily a complete answer cannot be given in these notes.

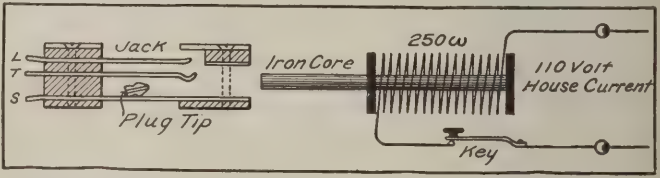
If So, How?

A PARTIAL answer, however, may not be altogether beyond the scope of our present deliberations. At first sight it would look as if the answering operator would have more work to do on each connection on the divided board than on the multiple board as she will have to trunk every call. But in reality she will have less work on each connection for the reason that she will have got rid of the big multiple field of jacks with its constant necessity for standing, reaching and stretching, and of passing cords to her neighbors on either side. The trunk jacks will all be concentrated in a small space as they will be a few hundreds instead of many thousands. The operator's attention and operations will then be confined to a small field of answering and trunk jacks instead of ranging over a field of many square feet. Then again, her work will be further lightened by the absence of ringing, as the trunking operator will do the ringing by means of a machine ringing key. A further gain will be in the fact that the answering operator's work will be entirely uniform, she will do exactly the same with each connection instead of, as now, trunking some and completing others by means of the multiple. As uniform operations can be done more rapidly than variegated operations, this will be a distinct gain. The general effect of the divided working will be that the work of completing a connection will be divided between two operators, each doing a part and each becoming super-expert at doing her particular part. The call will be taken in hand by one operator as soon as it appears, and, as soon as its direction is ascertained, it will be tossed, as it were, to the particular operator in a position and ready to complete it. Special devices and special methods will be adopted to enable the answering operator instantaneously to select the free trunk and the free trunking operator.

TO EXTRACT BROKEN TIPS FROM JACKS.

By J. R. Gemmill.

EVERY switchboard man knows that a broken tip in a jack is one of the most obstinate cases of trouble to clear, unless the strip of jacks is removed from the style pins and worked with from the back of the board, and all know that in clearing one such case of trouble there is a great chance of bringing in others by opening other connections on that strip. Especially this is the case where the strip in trouble is one of the lower ones say in the 200's. The writer has devised and used with great success, on a large board, a simple apparatus constructed as follows: Take a 125-ohm relay, and in one end insert a small soft iron core of such a size to go in the jack, so that the tip spring will be cleared. Cut in, in series with it, 200 ohms, preferably of non-inductive resistance, and connect to the apparatus about 8 feet of lamp cord, so that current may be taken from the socket in front of the board. Then procure a 20-volt lamp, such as is used in the line lamp signals, picking one that can be inserted in the jacks easily. Connect by flexible cords one terminal of the lamp to the operator's transmitter or any suitable point to get battery. The other terminal connect to the frame of the switchboard for the other side of the battery. This will give a good light by which to work. After locating the tip in the jack, insert the lamp in jack next or near the one in trouble, and then by using the magnet energized from the illuminating circuit on the switchboard the tip can be very readily extracted, provided it has a steel core. Most plugs are so constructed. The writer has found it convenient to mount the magnet on a small wooden handle and place a switch in the circuit so that it will not heat when not in use. The figure gives a good idea of the construction of the apparatus.



NEW TELEPHONE MONEY MAKER.

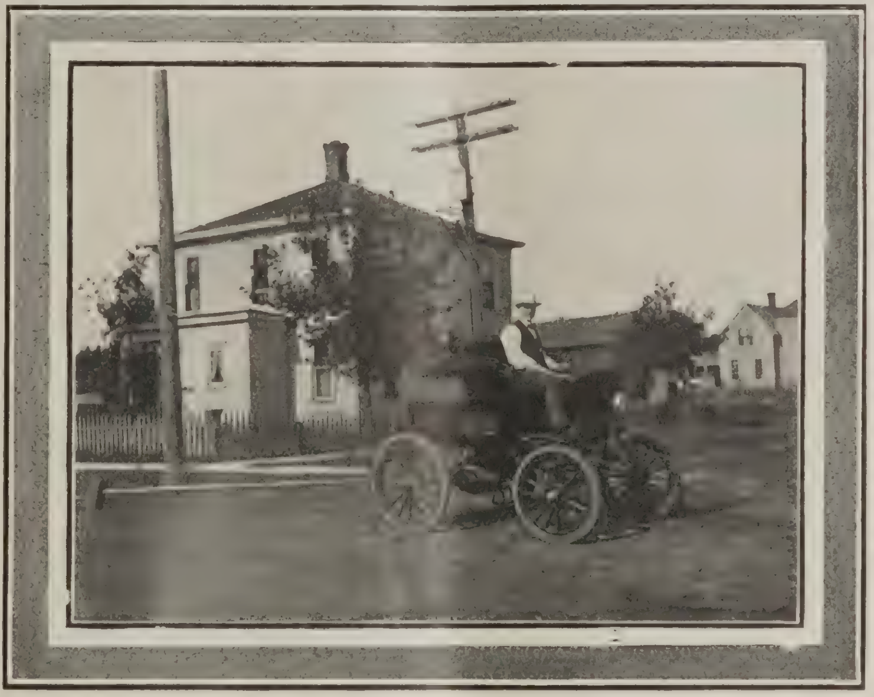
BALTIMORE, Md., supports a company which is working along rather original lines. An exchange says: "The United Message Company, recently organized, has fitted up an office installing a large number of telephones. The company will do business of all kinds for its subscribers. If a subscriber wants a person who has no telephone, a message can be sent to the latter by calling up the United Message Company. A subscriber may also make purchases through the company, which proposes as well to buy theatre tickets for subscribers, and forward telegrams, and packages. By means of the company's service it is claimed that a man can sit in his office, or a lady at her residence, and have almost any reasonable kind of business attended to for less than it would cost in carfare, to say nothing of valuable time saved."

LONG TELEPHONE WIRE SPANS.

SOME long spans of telephone wire are in existence in different parts of the country. It is reported that there is a span across the Columbia River, between Pasco and Kennewick in the State of Washington, which is 2,800 feet long. There is a span across the Susquehanna River at Lancaster, Pa., which is 3,200 feet long and has a dip at its center of 122 feet.

PULLED CABLE WITH HIS AUTOMOBILE

IOWA is a State of resourcefulness. The photograph illustrates an instance in which a thing intended for uses pleasurable was put to those most practical. The gentleman in the automobile is Mr. E. H. Martin, manager of the Webster City, Iowa, telephone exchange. The line attached to the rear of the machine is pulling a cable into the conduit. A manhole, with the cable drawing jig sticking from it, may be seen to the left of the picture. The following story is told of the way that the automobile first happened to be applied to this kind of work. Mr. Martin was making the rounds of his construction crews, and while watching the tedious method of cable drawing, by the use of a windlass the idea struck him that the method was unnecessarily slow and inefficient. After a few moments' contemplation he called to the foreman of the construction crew to fasten the draw strand, by means of which the cable was being pulled into the duct, to the rear of the automobile. This was done, and the machine moved steadily down the street, taking the cable and draw wire with it more smoothly and evenly than could have been done with the windlass. The ammeter in the front of the machine showed by its readings how much power was being taken to pull in the cable, and when the amount became excessive, which indicated an obstruction in the duct, the machine was stopped. After any obstruction had been removed the work proceeded. In half an hour Mr. Martin, with his automobile, had accomplished as much as three men could have in a day.



Mr. Martin says he does not intend to continue with this line of work, but simply demonstrated what modern apparatus can do. Some time ago it was necessary to repair the batteries at the telephone exchange, and while the repairs were being made the batteries in the automobile furnished the power required to continue service. The machine was run up to the exchange and leads were taken from its battery and attached to the proper points in the terminal room of the exchange and the service went uninterruptedly on. The automobile is equipped with 40 cells of Porter storage battery and weighs 2,400 pounds.

Webster City, Iowa, is of about 7,000 inhabitants. A central energy multiple switchboard, having a capacity of 1,000 lines, is in use by the Martin Telephone Company. There has been recently installed 15,000 feet of underground cable and 29 junction poles similar to the one shown in the illustration. The rates charged are: Business, $2.75; residence, $1.50; farms (20 party grounded lines), $1.25; farms (10 party grounded), $1.75; farms (10 party metallic), $2.25; farms (8 party selective metallic), $2.75. From the above rates there is a discount of 25 cents per telephone if the bill be paid before the 15th of the month for which the bill is rendered. It has been found that this penalty proves a very good one and it is better than any collector. The Webster City company was the first to adopt this practice. It is easy to see how a plant which makes a practice of such up-to-date methods is bound to succeed.

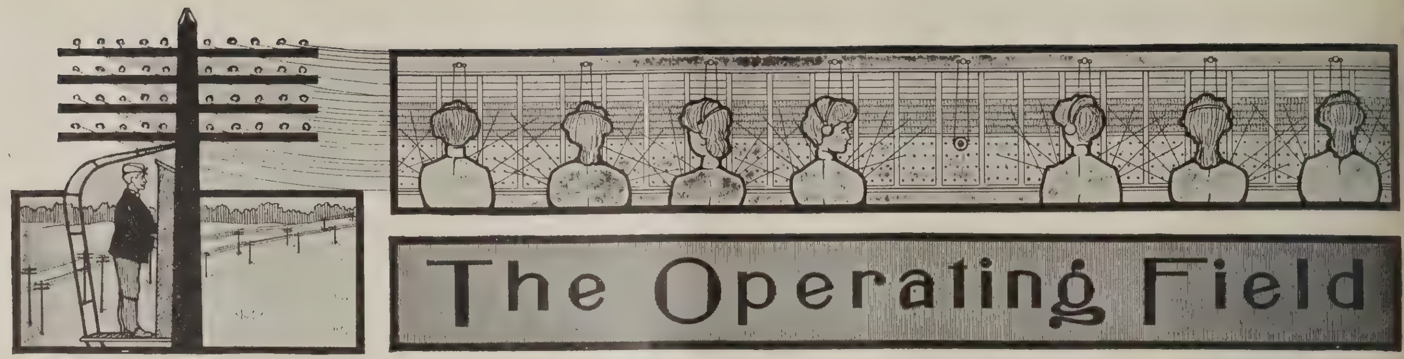
THE USE OF THE TELEPHONE IN SPAIN

SOME recent statistics as to the development of telephony in Spain are published by the *Journal Telegraphique*. From this authority there are 49 central stations in active operation, and 27 branch stations. These stations serve 12,819 subscribers. To each of the central stations a certain zone of operation is allotted, and all subscribers within these zones are expected to pay a tariff in accordance with the accompanying table. Subscribers who are located outside of the territory belonging to each station are in addition assessed a rate depending upon the distance they are removed from the office, or the length of line which is necessary to reach them. The extra charge amounts to about a dollar for every additional thousand feet of line. In addition to the central stations there are 12 telephone systems which belong to the Government, solely used for official communications. These lines are served by 12 central offices, and include 196 substations and 10 branch exchange stations. The table gives a list of the principal offices with the number of subscribers, and the annual charges together with the amount paid to the Government as a kind of tax.

Name of Central Office.	Number of Subscribers.	Government Tax, P. C.	Annual Tariff to Subscribers.
Barcelona	2,752	33.75	$30.00—$50.00
Madrid	1,967	20.00	$50.00
Bilbao	1,130	34.00	$20.00—$30.00
Valence	1,012	31.05	$33.33
Sabadell	388	22.50	$21.13—$40.00
S. Sebastien	314	21.00	$15.00—$83.33
Santander	354	12.00	$30.00—$50.00
Seville	310	10.00	$33.33—$50.00
Valladolid	245	10.00	$25.00—$50.00
Tolede	232	16.00	$15.00
Saragosse	290	20.00	$16.66—$60.00
Grenade	281	10.00	$25.00—$83.33
Alicante	218	10.00	$15.00—$40.00
Malaga	207	21.00	$25.00—$50.00

INDEPENDENT DEVELOPMENT IN INDIANA.

A RECENT census of the Independent telephones in Indiana places the number in actual service at 109,156. There are Independent systems and exchanges in every county of the state except two—Clark and Vanderburg. These counties will soon be invaded, a franchise having already been secured at Charlestown, Clark county. This development is regarded as remarkable, when the few years alloted are considered.



The Operating Field

DRY GOODS HOUSE ADVERTISES TELEPHONICALLY.

A USE of the telephone in the smaller cities which may be capable of extension if tactfully managed is indicated in the following interview with the manager of the dry goods department of a store in Fairmont, Minn., printed in the Chicago *Dry Goods Reporter:* "Every town has a class of trade that thinks the home stocks are harldy good enough, and when they want their choicest merchandise they get aboard the train and visit the nearest metropolis. Several times in the past we have planned special sales in order to catch this very class of people—the bon ton—but have always suffered defeat in a greater or less degree. Not so long ago we arranged to have a representative of a high-class manufacturer of suits and waists visit our store for a short period. We asked him to bring a line of first-class goods, which even the swell trade could not find occasion to find fault with. When he arrived we telephoned every woman in town whose trade we had had trouble in winning for their best apparel. They listened to our argument, and in nearly every case promised us over the telephone to look over the line of samples.

Women enjoy seeing nice things, and after we had notified them they seemed willing enough to pay our store a visit and examine what we had to show. The result of our efforts was to sell more to the bon ton trade than we had ever been able to at any past time. We attribute success to the telephone, as we were able to talk personally with the lady we wanted to visit the store, and she could not well do otherwise than consent to at least see what was being shown. After we had them in the store they found it a hard proposition to do anything else than buy if they were in need of garments. By the old way of advertising we could not secure an acceptance of our invitation to look over the line. Letters required physical effort to answer. Personal visits by us to the home of the desired customer were hardly possible. Sending clerks or errand boys does not result in such effective returns. The object is to secure a positive acceptance or declination from the lady herself by one of the firm. The telephone does this in a more successful manner than any other plan we have ever tried."

MUST COMPANY DISCLOSE USER OF THE WIRE?

A NOVEL point will be raised in a trial in the police court at New Haven, Conn., as to whether the Southern New England Telephone Company can be compelled to disclose the identity of a person who used the telephone and rang off without giving his name. A policeman of the city had raided a policy shop and was picking up policy slips and other paraphernalia when the telephone bell rang and the officer answered. "Hello, here are your numbers," came over the wire. The officer took them all down and then said, "Who is this talking?" "John Doe," was the reply as the receiver was hung up. The officer called up the telephone office and asked who had been talking, but was told that it was against the rules of the company to reveal it.

SWITCHING AGREEMENT AT RUSHVILLE, ILL.

BY an agreement lately entered into, the Mutual telephone companies that now have lines built into Rushville, Ill., will connect with the switchboard of the new Rushville Company. There are a number of country lines, which will connect with the other lines on a basis of free exchange. The agreement between the city and country lines was made by committees appointed by each company. It was mutually agreed that the country lines should pay the city exchange $1.50 per year per telephone for the switching service and that there should be free exchange between the two companies. The telephone company in Rushville is at present shaving its poles, and will, in a few days, start setting them. It is probable that two months will be consumed in the construction of the plant.

CORNET INSTRUCTION OVER TELEPHONE.

FRANZ RATH, one of the prominent musicians of Central New York, and who has written several musical selections which have been received with favor, has adopted a unique method of giving instructions on the cornet to one of his pupils. The pupil injured his leg and is unable to leave his home. Prof. Rath hit upon the novel expedient of transmitting his musical instructions over the lines of the Utica Home Telephone Company. The experiment worked very satisfactorily, indeed, as the notes of the cornet were plainly audible at each end of the line, and whatever suggestions the professor had to make were, of course, just as readily sent over the wire. It is not expected that this means of cornet instruction will be universally adopted at once, but it is an interesting fact that the telephone served the purpose admirably in this instance.

IT WAS DIFFERENT WHEN EXPLAINED.

RECENTLY the manager of a large department store was at his desk deep in thought over some intricate business problem of the day. Not far away stood the young woman who has charge of the sheet music department, carrying on an animated telephone conversation.

When the manager came out of his reverie his attention was arrested by scraps of conversation that issued from the booth. "I love you, dear, and only you—I'm wearing my heart away—can't live on love—I never was hurt until then—I've a longing in my heart for you, and maybe when the harvest days are over I'll think of you—dreamy eyes—just kiss me good-bye—yes, a dream of the golden past—good-bye, forever."

Before he had recovered from his astonishment and wonder the young woman hung up the receiver and stepped from the booth. "Miss Jones, come here," he commanded, sternly. "It's strictly against the rules of this store for salesepeople to use the telephone for personal business. I must forbid you to do it any more. Hereafter, when you wish to make love to a young man, don't do it over the telephone, where every one can hear everything you have to tell him. Now, go to your department." "Why, Mr. Brown," she answered, "I was simply ordering some new sheet music which we need from the publisher.

TELEPHONE SERVICE AT CLEARFIELD, PA.

UNIVERSAL satisfaction is being given by the new telephone service of the Huntingdon and Clearfield Telephone Company, which was recently installed in Clearfield, Pa. The officers of the company are: President, Ellis L. Orvis; Vice-President, Asbury W. Lee; Secretary, G. H. Lichtenthaler; Treasurer, Allison O. Smith; General Superintendent, W. L. Malin; Superintendent of Construction, O. C. Campbell; Electrician, O. B. Porter; Special Agent, H. H. Crocker. Exchanges are in operation at Philipsburg, Curwensville, Osceola Mills and Clearfield.

In round numbers, seven hundred telephones have already been installed in these four towns. The work is being pushed so that all of the important towns in Clearfield County will soon be connected with the system. A line is being built toward Tyrone, at which point connections will be made with the United Telephone Company, which will give connection with all of that company's system.

AN OPERATORS' ALLIANCE IN INDIANAPOLIS.

A NICE little telephone exchange romance recently developed in Indianapolis. The American Press Association has a great deal of long distance telephoning to do at night to its country subscribers, giving them the important late news. L. G. Preston is one of the machine operators for the American Press Association, and one night when there was a lull in the proceedings he asked the editor to let him "make those telephone calls." Preston was a rather confirmed bachelor, set in his ways and these did not lead much toward women. "Say," said he, after he got through, "that girl's got a mighty sweet voice and clever way about her." He learned to like the telephone assignments in the mid-hours of the night and the more he heard that voice, the better he liked it. One night the editor was asked after he got through with his out-of-town messages: "Say, Mr. S, isn't Mr. Preston one of the nicest men on earth? He sent me theatre tickets for myself and mother and the prettiest flowers." Mr. S. chuckled to himself and fancied he knew what was coming. He did. It came—the wedding of Miss Martha Kelley and L. G. Preston.

GENEVA, N. Y., TO OWN TELEPHONE POLES.

AN important contract was approved at a recent meeting of the Board of Public Works of Geneva, N. Y., as a permanent solution of the congestion of telegraph and telephone poles on the streets of the city, which have threatened to cause litigation. The trouble arose over the endeavor of the Board of Public Works to force the New England Telegraph Company, the Empire State Telephone and Telegraph Company, the Geneva Telephone Company, and the Geneva Power and Light Company, all of which corporations have wires in the street, to use a single line of poles.

The board conceived the plan of making the city the owner of a line which the several companies are to provide and maintain. This contract is considered unique in corporation law, as it was framed to meet the peculiar conditions that existed in Geneva. It binds in a permanent agreement, a corporation that is doing business in several States, a corporation that is transacting business only in New York State, two local corporations and a municipal corporation. It gives the city absolute title to property that it has paid nothing for, and which it will never be at any expense to maintain.

PORTAGE COUNTY TELEPHONE CO.

STOCKHOLDERS of the Portage County Telephone Company, of Akron, Ohio, feel well satisfied with the record it has made during the first six months of its corporate existence, which have just been finished. Akron citizens are largely interested in the enterprise. Fred. E. Smith, of Akron, president of the company, states that since it was formed it has increased its subscribers by more than 300. "We have had a very successful half year," said Mr. Smith. "We have built several miles of new toll line and in Ravenna the system has been entirely rebuilt."

The Portage County Telephone Company was formed from a number of Independent telephone companies, located in Kent, Ravenna, and Mantua, Portage County. These have been placed under one management, and the new company promises to give the county a good telephone service with long distance connections.

NO "CLEO DE MERODE" COIFFURES.

POOR telephone girls; they are never allowed to rest in peace for long. The Stockholm telephone authorities are finding fault now with the way in which they do their hair. It appears that of late the Swedish lassies who put you through to the number you ask for—or otherwise—have adopted the mode of coiffure first initiated by the French dancer Cléo de Merode, in which the hair is drawn down over the ears. The subscribers have since found a falling off in the hearing powers of the operators, as the result of which complaints of inefficiency in the service have been made, and the girls ordered to change their style of hair-dressing. This they have refused to do, and there seems a prospect of another labor crisis in Stockholm.—*London Electricity.*

P. & A. EXCHANGE AT McKEESPORT.

BIDS for the Pittsburgh & Allegheny Telephone Company's new building at McKeesport, Pa., have been opened. The contract for the erection of the building will be let at once, with the stipulation that it be completed within 60 days after the award. The subway is completed, and with the erection of the building the P. & A.'s plant in that city will be one of the finest in the country. The building will cost $25,000, and will be a model of convenience. It will be of brick and terra cotta, two stories in height, and will stand at Sixth Avenue and St. Clair Street. The first floor will be used for the general offices and power plant. On the second floor will be the switchboard of 36,000 lines, and reading rooms for the operators, with dining-room, kitchen, lockers and retiring rooms.

RICHMOND HOME CO. IMPROVEMENTS.

THE Richmond Home Telephone Company is engaged in making extensions and increasing its capacity. The company has about 1,800 subscribers and there are some hundred applications for telephones that cannot be filled until the new cable is installed. This is now being done and when it is completed it will be possible to add 350 new instruments to the plant, which will exhaust the capacity of the switchboard. Five miles of cable are being strung. The company has connection as far west as St. Louis, and will soon be able to give service to points through Ohio and southern Michigan. This will be by way of Dayton. The company is arranging to put in a new party line to reach the territory about two miles east of Boston.

ILLINOIS T. & T. CO. BUILDS TO SPRINGFIELD.

COMMUNICATION is now established to Springfield over the lines of the Illinois Telephone and Telegraph Company. The company's lines there connect with those of the Interstate Telephone and Telegraph Company, which has recently established an Independent exchange in Springfield and has already installed a large number of instruments. The Illinois Company will have access to every line owned by the Interstate Company, which gives it communication with Springfield, and will also include Peoria, Pekin, Joliet, Aurora, Elgin, and many other cities in that district. The line from Jacksonville touches every station on the Wabash Railroad between Jacksonville and Springfield.

ANNUAL MEETING OF NORTHVILLE CO.

ONE of the local Independent companies of Michigan, the Northville Telephone Company, of Northville, held its annual meeting recently and elected the following directors for the ensuing year: Dr. J. M. Burgess, president; F. S. Neal, vice-president; R. H. Porter, secretary; E. H. Lapham, treasurer; M. A. Porter, manager; A. K. Carpenter, Dr. J. M. Johnson, W. H. Yerkes, W. G. Yerkes. The company has about thirty miles of wire and 150 subscribers. Its lines extend from Plymouth to Farmington via Novi and connect with many farmers on the east and west roads. The stockholders will get a 10 per cent. dividend for the past year.

MICHIGAN RAILROADS ADOPT SIMULTANEOUS.

OFFICIALS of the Grand Rapids & Indiana Road are in daily communication between Grand Rapids, Mich., and Cadillac over a simultaneous telegraph and telephone system. No other railroad in lower Michigan has such a system in operation, but since the G. R. & I. has proven it practicable, the Pere Marquette has arranged for the installation of a similar service on its lines between Detroit and Saginaw.

The Editor's Page

HOW THE BELL IS USING THE KELLOGG COMPANY.

THE DUTY OF INDEPENDENT OPERATORS.

THE American Bell interests are beginning to capitalize their purchase of the Kellogg Switchboard & Supply Company, and they are doing it as they invariably do everything along this line, by back-door methods. These people have become so thoroughly accustomed to manipulating underground, that it has become second nature with them, and a straightforward course, even if it should prove more profitable, would be impossible.

When the Kellogg purchase, after a year and a half of double dealing, was finally dragged into the open, and the company was formally branded by its minority stockholders as an out and out Bell concern, the question naturally arose, how are the controlling owners going to use their purchase to the detriment of the Independent industries? No one questioned that the purchase was directed by the desire to cripple Independent competition, and no one questions it now, despite the ingenuous denials of those in interest. It was simply a question of how. A partial answer is at hand. As a preliminary to carrying out their ultimate purpose with the Kellogg Company, the Bell interests are using their purchase as the basis of an ingenuous press campaign to frighten off capital.

For six or seven years the Berliner patent proved the favorite weapon in this kind of a campaign, always a strong factor with the Bell. When the Berliner scarecrow was finally dismembered by the United States courts a few months ago, the gentlemen in Boston naturally felt lonesome and looked about for another club with which to arm their friends of the press. Evidently they believe they have found such a club in the Kellogg sale, and that they may, by distorting the facts, scare timid capitalists once more, out of any interest in Independent industries. An example of this new kind of press work is to be found in an extract from an article printed originally in the Boston *Financial News* bearing on the suit instituted by the minority stockholders to set aside the sale of the Kellogg stock to the Bell Company. The extract reads as follows:

> "This suit is still pending, and if finally decided in favor of the American Telephone & Telegraph Company would give that company complete control of the entire telephone field, as with the only patents in common use other than those controlled by the American Bell Company, in its possession, it would be in a position to collect royalties from all of the Independent companies."

To a telephone man, Bell as well as Independent, this sort of talk is ridiculous enough. Every shop boy in the trade knows that whether the Kellogg sale is confirmed or set aside, whether the Bell people are ousted or sustained in their control of this company, makes and can make not the slightest difference to the cause of Independent telephony. Every shop boy knows that the statement that the American Bell would under any circumstances be in a position "to collect royalties from all of the Independent companies" is silly rot or rather ingenious falsehood. But this sort of stuff is not put out for consumption in the trade, in the circles where men know. It is set afloat to affect the general lay public who know nothing of the telephone situation except that the advent of the Independent has brought a very much higher grade of service at a very much lower rate of cost. And for a time the public will, perhaps, be affected by this newest system of press work. It will be the Berliner bugaboo over again, and the Bell people are bent on making the most of it.

As is well known, the Bell has a number of organs that it uses for the purpose of starting such press matter as it deems hurtful to the Independent cause. All these papers were used, in this instance, to put out in substance the paragraph quoted above. And to give it greater effect, there was attached the following little joke:

> "When asked as to the suit, President Fish merely stated that he had nothing to say other than he was entirely satisfied with the situation."

Naturally it is difficult to stop this sort of work. With thousands of active Bell agents in the field to keep the press ball rolling once it has been started by the Boston organs, a pretty powerful engine of misrepresentation is let loose. In the face of such warfare, it behooves all Independent telephone men to stand together, and refuse dealings with the Kellogg Company until it shall have been purged of its present controlling influences. As matters stand now, not alone is the Independent field invaded under false pretense through the agency of this company, but this very invasion is brazenly used by its masters to give the people an entirely false notion of the situation. As the sporting fraternity would put it, the Bell people are playing both ends against the middle. It is up to the Independent operators to say whether or not they will help the game along, or refuse to have anything to do with Bell agents under whatever guise they may come to them.

TELEPHONES IN NEW ZEALAND.

IN a recent annual report of the Post and Telegraph Department of New Zealand the following telephonic information is given.

The number of central exchanges increased during the year from 23 to 26 and the sub-exchanges from 35 to 44. With this expansion there was an increase of 1,373 new subscribers, bringing the total up to 10,633. The exchange subscriptions for the year amounted to £58,410, an increase of £6,424 over the previous year.

FOREIGN CURRENTS

By "The Arrester."

THERE has so far appeared in the English electrical journals but little comment on the telephone inquiry at Hull. The principal advocate of municipal telephony among those journals—*The Electrical Times*—devotes but one small paragraph to the matter, which is somewhat strange since at an inquiry lasting four days the subject of municipal telephony must have been pretty exhaustively discussed. The only editorial opinion that has so far appeared is an article in the current issue of the *Electrician,* which reviews the history of the strange telephone dispute at Hull and strongly deprecates the construction of the proposed municipal system. The telephone history of Hull has already been depicted in these notes, and it will be remembered that owing to the "cuteness" of the Hull Corporation in acting on their technical rights the underground system of the National Telephone Company exists only on sufferance. Under these conditions the proposal of the municipality to compete could hardly be viewed with equanimity by the company. The latest phase of the negotiations between the two parties was an agreement providing for intercommunication between the two systems, the company's underground wayleaves to be continued at a reduced rate. If the municipality would agree to refrain from competing, the company offered to extend the service by introducing a message rate tariff, the flat rate of $50 to remain in force.

Saving the Taxpayers Money

THE *Electrician* points out that the prospects of the Hull enterprise are by no means rosy. The license runs only to 1911, when the Post Office may buy only a portion of the plant. The company's plant at Hull is central battery and gives an efficient service; the municipality proposes to put in a cheap plant and to allow only 2½ per cent. for depreciation. Taking all these matters into consideration, the *Electrician* writer thinks that the Corporation of Hull is hardly well advised in seeking to put in a competing telephone service in Hull, if there remains any possibility of its making reasonable terms with the National Telephone Co. The case would appear to be one in which the purchase of the company's Hull undertaking by the Corporation would have been the most reasonable solution of the difficulty, for the Corporation was certainly in a position to make good terms for itself. Now, if, as is probable, the Local Government Board inspector decides that the opposition to the scheme by the small but influential body of rich ratepayers who are against it, is not sufficient reason to refuse the loan, we shall have, of necessity, a large waste of public money. The Corporation will doubtless make its telephone service pay—on paper—until 1911, when it will be found that the depreciation has been far greater than at the rate of 2½ per cent. per annum, and also a large part of the loan will still remain to be paid off, as the money will be lent for 25 years. Then, if the Post Office does not buy at the book value of the undertaking, the ratepayers will have to bear the loss; or if the Post Office decides to buy for a large price a plant that will be largely useless, the loss, of course, comes upon the taxpayer.

A Contrast in Conditions

THE telephone history of Hull, as far as it has gone, affords a most instructive illustration of the difference in the conditions that surround the telephone business in different countries. Here in America it is the municipality that urges the telephone company to put its wires underground and to clear the streets and the housetops of poles and wires. In England the municipalities seem to look upon the subsoil of the streets as their own private property, and only allow the telephone companies to use it under onerous and expensive conditions, even going to the absurd length of providing that on six months' notice the wires shall be taken up. At Hull this notice was actually given and the wires have existed for the past three years on sufferance. What telephone Company could be expected to develop its business properly under such conditions as those? Then, if a municipality desires to take up the telephone business, it has to do so under a government license which expires in 1911, and on the expiration of the license the Post Office—which exacts a royalty of ten per cent. on the gross receipts meantime—undertakes to buy only so much of the plant as may be suitable at the time for the actual requirements of the telephone service of the Post Office. In other words, the Post Office may buy any part of the plant, all of it, or none at all. The alternative is that the Post Office may renew the licenses, and that is a very possible alternative, but the general idea seems to be that the Post Office will take over the whole telephone business in 1911. Whether it will or not, we shall have to live until 1911 to see.

From Darkness to Light

TO turn from all these harassing restrictions and unpractical conditions to the free and open field that exists in the United States is like turning from darkness to light. Here we have what may be called free trade in telephony. No government monopoly, no limited license, no royalty on gross receipts, vex the American telephone manager or combine to put a false aspect on his business. American municipalities have wisely held their hands and have left a highly technical and somewhat mysterious business, which is still largely in the experimental stage, entirely in the hands of private enterprise. It might even be said that American municipalities have freely encouraged private telephone enterprise; at any rate, they have stood aside and let private enterprise have full sway to do its best for the public according to its lights. Certainly they have shown no disposition, as far as our observation goes, to impose on telephone enterprise the restrictions that British municipalities seem to consider necessary. As a result, telephony has reached in this country a pitch of development that is unapproached elsewhere. Great Britain should offer almost as good a field for telephony as the United States, and if private enterprise had a fair show the great difference that now esists would doubtless largely disappear.

Telephone Progress in New Zealand

THE annual report of the Post and Telegraph Department of New Zealand, just issued, gives some data of telephone progress there. The figures are very modest and afford yet another illustration of the lack of telephone development under government control. During the year the number of central exchanges increased from 23 to 26 and the branch exchanges from 35 to 44. With this expansion there was an increase of 1,373 subscribers, bringing the total up to 10,633. The revenue from exchange subscriptions for the year was $1,292,050, an increase of $32,120 over the previous year. From these figures it appears that the average revenue per subscriber is about $27.50, certainly not a very high rate. The total amount of telephone wire in use is 8,727 miles, an increase of 960 miles during the year. From these figures we strongly suspect that the telephone service in New Zealand is still run on the ancient grounded wire system.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

NO RIGHT OF ACTION.

"WE were granted a franchise by the city council for a period of twenty years, paying one per cent. on gross income, and under promise from the mayor of protection from other companies coming in we made reduced rates of $1.50 for business telephones and $1.00 for residence and gave our subscribers free use of country lines, expecting to get all the toll business for our outlay. Later the Bell Company makes application for permit or franchise to enter, and the council, composed of four members, got the opinions of several attorneys in regard to keeping them out and all opinions were the same, 'that the city had a right to refuse to grant the same under the amendment of section 1251, chapter 12, article 6, Revised Statutes of Missouri, by the last general assembly, approved March 23, 1903.' Since the above law went into effect, the mayor with two of the four councilmen met and granted a permit for this Bell Company to enter the city and put in a fifty-line board and parallel our lines out over the country, also putting in three local telephones so far in the city. They pay no per cent. for the privilege of doing business and have no limit to their franchise. Have we any show to claim damages from the city or from the mayor and can we bring any action against this Bell Company for infringing our rights?

"S. & S."

FROM your statement, the only assurance you appear to have had that your franchise would be exclusive was the verbal promise of the mayor. This would not make your franchise exclusive nor prevent the council from legally granting a franchise to another company. The United States Court of Appeals in the case of Muskogee National Telephone Company v. Hall, 118 Fed., 382, relying on the case of Pensacola Telegraph Company v. Western Union Telegraph Company, 96 U. S., 1, held, "Telephone companies, like telegraph companies, are important agencies in the transaction of interstate commerce, and neither a state nor an Indian nation has power to grant to one company an exclusive right to maintain telephone lines within its territory. Such a grant, being void *ab initio*, cannot be invoked to prevent the construction and maintenance of lines by other companies or persons, although they are not interstate, but merely local." It is therefore very doubtful whether an exclusive franchise to a telephone company would be good in any case. You cannot claim damages from the city because the mayor had no authority to bind it by his promise. Neither is the mayor personally liable for making a promise he failed to keep. Having no legal right to an exclusive franchise, you could not bring any action against the Bell Company for its invasion of your territory.

REFEREE DECIDES FOR THE CITY.

THE ordinance of Kansas City, Mo., compelling the Missouri & Kansas Telephone Company to reduce its rates for business and residence telephones from $96 and $60 respectively, to $60 for business telephones and $36 for residence telephones, has been upheld by T. J. Smith, of Butler, Mo., the referee appointed by the Supreme Court to hear the evidence on the company's contention that the reduction was unreasonable and practically meant confiscation. The supreme court will convene in October, when it will pass upon the findings of the referee. In his report the referee says he found the physical assets of the telephone company to be of the value of $857,000 and that the company was making on the actual capital invested 32½ per cent. since it was organized in 1882. The referee found that when the company organized for $1,000,000 its physical assets were not worth over $200,000, that the local company gave to the Bell Company all of the $1,000,000 except $46,000 and then took the earnings with which to pay up that stock. The referee found that a measured service was not a reasonable service for Kansas City.

One of the most important findings of the referee was that the business of the company is separated at the state line, that a Missouri company is doing business in Kansas City, Mo., and a Kansas Company is doing business in Kansas City, Kan. The importance of this finding is that it appears to eleminate the question of interstate commerce entirely. It appears in evidence before the referee that the Bell Company compelled companies under its control to buy equipment from the Bell concern on the ground that they got better equipment. The Bell company charges $3.60 a year rental for transmitters and receivers and in this manner added greatly to the expense account of the local exchange. In his report on this point the referee says:

In my opinion the actual value or reasonable cost of these transmitters and receivers is not greater than the annual rental that has been heretofore paid by the telephone company. In my opinion the evidence discloses no good reason why the transmitters and receivers manufactured and sold by Independent concerns could not be used in the giving of service by defendant (the Missouri & Kansas Telephone Company), with as satisfactory results to its patrons and at less cost than is incurred by using the Bell devices.

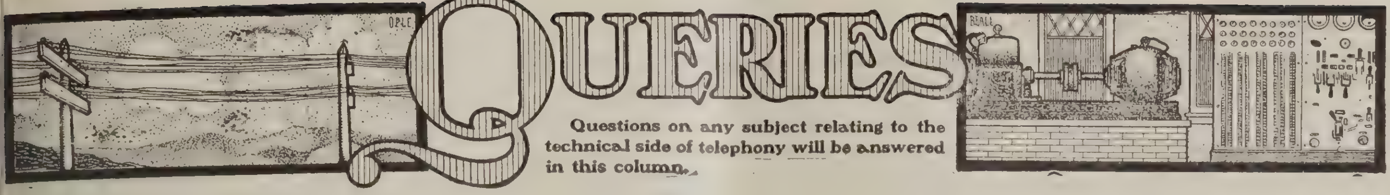
The report concludes by declaring that the cost per telephone per year in Kansas City does not exceed $27 and that under the rate the city is endeavoring to fix they could pay all expense of operating, maintaining and repair and still pay more than 8 per cent. dividends on stock.

TELEPHONE OFFICIALS CENSURED.

JUDGE BAKER, of the United States Circuit Court, sitting in Indianapolis, cited the officers of the Central Union Telephone Company to appear before him two weeks ago and advised them to make all haste in putting the company's lines in such condition that the turning of the high current on the wires of the Indianapolis & Northwestern Traction Company would do the telephone plant no injury. Judge Baker censured the telephone officials for delaying work and notified them that the temporary restraining order against the Traction Company turning on a high current would be dissolved in a few days. He said it would be manifestly unjust to tie up the operation of the Traction Company while no effort is being made by the Telephone Company to reconstruct its lines in a manner provided by law. Judge Baker said the law of Indiana, approved in March, 1901, made it incumbent on a telephone company to construct its wires over the tracks of railroad companies within the state at least twenty-five feet above the rails, supported by substantial wooden poles at least twelve inches in diameter at the bottom, or iron or steel poles at least five inches in diameter at the bottom and set six feet in the earth, well tamped.

A DECISION BY JUDGE SETTLE.

JUDGE SETTLE, of the Court of Appeals, at Bowling Green, Cumberland Telephone and Telegraph Company, has decided Ky., in the case of the Rough River Telephone Company v The that the injunction granted by the Ohio Circuit Court of Appeals must stand until the case is tried on its merits in the latter court.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

BRIDGING A RECEIVER.—(198.)

What is the advantage in placing the secondary coil and receiver in series on a bridged line rather than bridging the receiver across the line.
J. U. N.

We are not sure that we understand your question exactly, but if you intend to connect the receiver as indicated by R and R' in Fig. 198a, the receiver nearest the talking station would take the most current and the current through the receiving instrument would be correspondingly diminished. For instance, suppose station S' to be talking, there would be a voltage generated in the secondary coil A'. This would send current over the line, a portion of which would pass through R' and a portion through the secondary coil A at the station S. The rest of the current would pass through R. The part that passed through R' would be proportional to the resistance of its circuit and the portion that passed through R would be proportional to the resistance of its circuit. The resistance of the R' circuit would be alone the resistance of R', but the resistance of the R circuit would be equal to $R + L + L_2$ (L and L_2 are the line wires between the two stations). Therefore if the stations were very far apart the resistance of the R' circuit would be so much less than that of the R circuit, that most of the current would be shunted through R' and little would reach R. In Fig. 198b is shown the ordinary circuit arrangement of two stations. It is evident that current that passes through one receiver must pass through the other. Therefore, if the receivers are similar the sounds in each will be of equal volume.

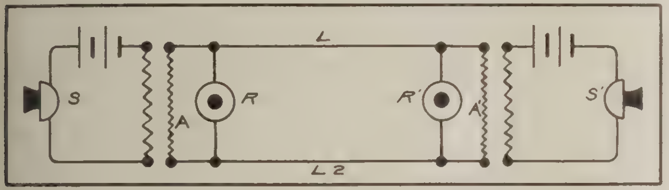


Fig. 198a.

GROUNDING LINES DURING STORM.—(199.)

In our exchange we have one ampere fuses on the distributing rack, at the cable pole and at the instruments. Our system is a ground return. In case of lightning, we can ground all of the lines on the exchange side of the fuse but when we do this, after the storm we have a great many open fuses. Do you think it is best to so ground the lines? H. I. C.

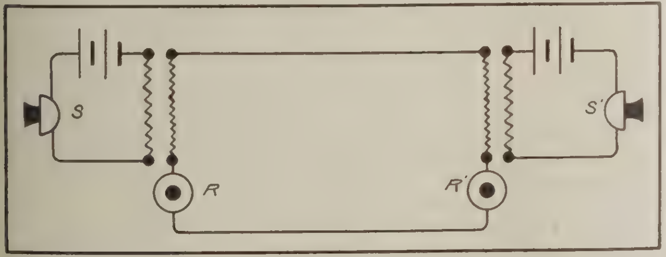


Fig. 198b.

Undoubtedly, if your lines are grounded at the central office during a storm there is much more liability of having trouble from open fuses. We do not, however, think it would be at all advisable to omit the grounding, as it gives much protection to the exchange apparatus. It is well worth the trouble incurred in replacing the open fuses.

DUPLEX CIRCUIT.—(200.)

What is meant by a duplex circuit. M. A. Q.

A duplex telephone circuit is one over which two conversations can be carried on at the same time. This result is accomplished by the proper use of resistance coils. Fig. 200 shows such a circuit arrangement. S_1 and S_2 are two telephone stations connected by a metallic circuit. R_1, R_2, R_3, and R_4 are resistance coils. Each of one of the pairs are of equal resistance. The combined resistance of either pair of coils should be higher than that of the line, so that most of the current from either S_1 or S_2 will pass over the line instead of around through the coils. Current from S_3 to S_4, or vice versa, would divide itself equally between the resistance coils in flowing over the line, and there would be no tendency for current flow through S_1 and S_2.

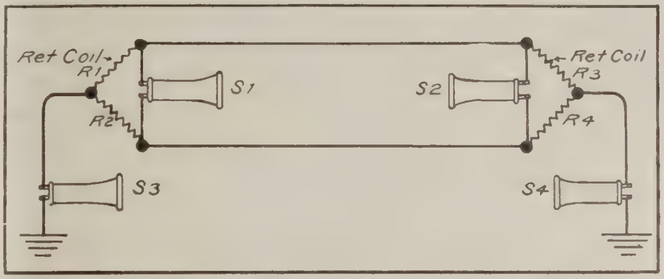


Fig. 200.

SPLICING IRON TO COPPER WIRE.—(201.)

Does it do any hurt to splice iron wire to copper wire? L. O. C.

In a general way it may be said that no injury would result. As the iron wire is a poorer conductor than the copper wire, it would seem inadvisable to build a line in this way. If the joint is located in a damp situation, or exposed to corrosive fumes, there might be some difficulty with electrolytic action, but under ordinary circumstances, the joint will be likely to last as long as the wire.

REGARDING A HAND GENERATOR.—(202.)

A. Is a hand generator such as installed with a desk set open when not in use?

B. What is the furthest point west that can be reached by telephone from Boston. J. W. N.

A. Yes, the generator circuit is automatically opened when the generator is not in action.

B. Omaha, Nebraska, is the westernmost city which can be reached over the long distance telephone lines from Boston.

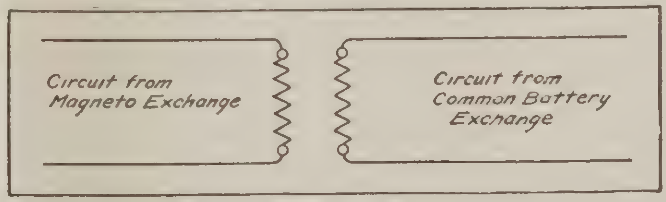

Circuit from Magneto Exchange
Circuit from Common Battery Exchange

Fig. 203.

CONNECTING MAGNETO TO COMMON BATTERY.-(203.)

Will you show on your query page a diagram showing how a magneto exchange can be connected to a common battery exchange? L. H. T.

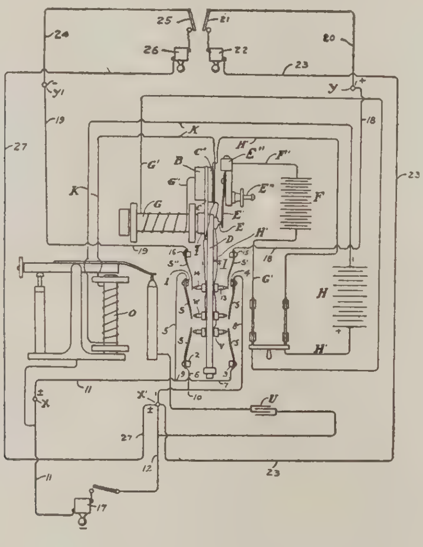
Without being familiar with the details of both systems we could not give a complete circuit. Interconnection between magneto and common battery exchanges is always performed through the medium of repeating coils which are usually inserted in the trunk circuits between the exchanges. This arrangement is roughly indicated in Fig. 203. This, of course, is simplified and robbed of the contrivances used for signaling between the two exchanges.

PATENTS ISSUED

POLE CHANGER.

T. W. Warner, of Muncie, Ind., patents (No. 739,128) and assigns to the Warner Electric Company of Muncie, Ind., an improved pole changer. The object of this invention is to provide a method of wiring a pole changer in such a manner that three kinds of currents, positive pulsating, negative pulsating, and alternating current may be used. The device is shown in the figure. On a suitable base a post *B* is secured, to which a vibrating arm *c* is attached. This arm is a contact spring *E′* and contact *E* which is in series with the battery *F* and the magnet *G*. By this means the arm is caused to vibrate in the well-known circuit breaking manner. The battery *H*, the relay *O* and contact springs *s′*, *s″* and *s*, together with the wiring as shown, complete the apparatus. The circuits can be readily traced. The operation is as follows:

By referring to the figure and assuming that the contact *V* is connected to the positive pole of the ringing battery and the contact-point *W* connected to the negative pole of the same and assuming that the arm is moved to the right, thereby connecting the wire *7* to the positive pole and the wire *8* to the negative pole, a positive current will be passed through the wire *11*, then through the bell *17* to the switchboard in the central office, and a negative current will be returned through the wire *12*. When the arm is moved to the left, making a connection with the posts, the positive point *V* will send a positive current through the wires *6* and *12* to the switchboard in the central office, then through the bell *17* and the negative contact-point *W* will draw a negative current through the wires *11* and *5*, thereby alternating the currents in both wires *11* and *12* at each vibration of the arm. It is to be understood that the wire *12* connecting the switchboard to the device, could be grounded if found desirable. *X X′* designate binding-posts for the alternating-current wires.



The operation of producing the pulsating current is as follows: Assuming that it is necessary to have a pulsating positive current to ring the positive ringing-bell *22*, the switch *21* is moved to close the circuit. When the arm is moved to the right, the contact-point *13*, which is positive, will send a positive current through the brush *S′*, post *15*, wire *18* to the wire *20*, through the switch *21*, through the bell *22*, and then back through the wire *23* to the binding post *X′*. Then the current will pass up the wire *12*. Inasmuch as the arm is moved to the right there is no contact with the contact-points on the left-hand side of the arm, so that the current will pass through the wire *8*, post *4*, brush *S* to the negative contact-point *W*, then back to the battery *H*. When the arm is moved to the left there is no positive current flowing through the wires, thereby breaking the circuit and producing a pulsating positive current. When the switch *25* is moved, closing the circuit through the negative ringing-bell *26*, a negative pulsating current will be produced when the arm is moved to the left, bringing the contact-point *14* into engagement with the brush *S″*, post *16*, wires *19* and *24*, through the switch *25* and bell *26*, back through the wire *27*, binding-post *X′*, wires *12* and *6*, through the contact-point *V*, back to the battery *H*.

TELEPHONE COIN BOX.

Rudolph W. Goeb, of St. Louis, Mo., patents (No. 739,075) and assigns to the Controller Company of America an improved mechanism for coin boxes. This invention relates to the construction of a coin box in such a manner that a telephone receiver is locked upon the hook and can be released by the deposition of a coin in the proper slot, and also provides means whereby the receiver can be released by those who are authorized to use the telephone. This invention is in very many respects similar to the preceding one. It is shown in Figs. 1, 2 and 3, of which the hook switch is shown at *2*, the receiver at *3*. The receiver is locked in place by means of a spider *9*. This spider is prevented from rotating by means of the lever *12*, which is set free upon the deposition of a coin in the slot *6*. There is an electro magnet *16* which, when excited, can actuate the lever *17* that is able to set the spider *9* free in the same manner as the deposition of a coin.

Fig 1

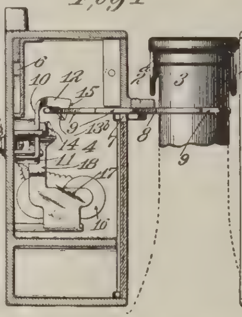
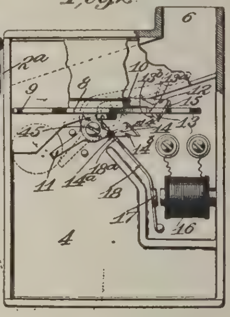


Fig 2



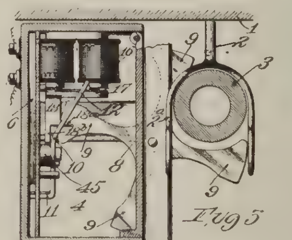
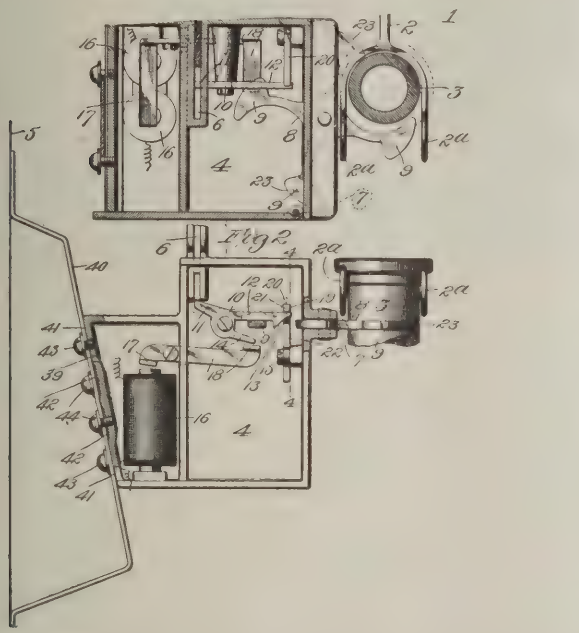


Fig 5

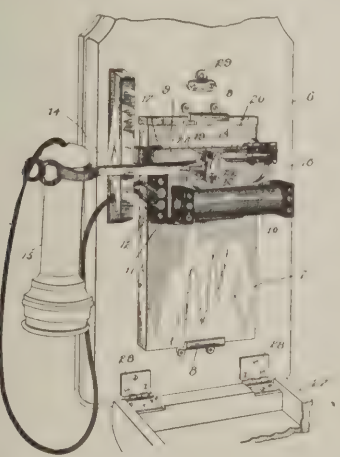
TELEPHONE COIN BOX.

Wm. H. Scott, of St. Louis, Mo., patents (No. 739,114) and assigns to the Controller Company of America a telephone lock. The object of this invention is to provide a device, whereby the receiver is locked upon the receiver hook, although the hook may be free to move in order to signal the central office. Unlocking is effected by means of depositing the proper coin. A further object is to provide means whereby persons who are authorized can unlock the receiver, and use the telephone independently of the deposition of the coin. The apparatus is shown in Figs. 1 and 2, in which *3* is the receiver and *2* is the switch hook. As shown in Fig. 1, there is a spider-shaped wheel *8* which is pivoted in such a manner as to enclose the receiver when it is on the hook. This spider is locked by means of the coin lever *12*, and lever *20*. When a coin is placed in the coin slot *6* the lever *12* is lifted and the spider set free so that the receiver can be removed. In addition there is electro magnet *17* that is actuated by a battery, and a switch is placed under the control of any person authorized to use the telephone without charge. Actuating this electro magnet has the same effect as a deposition coin and allows the receiver to be removed.



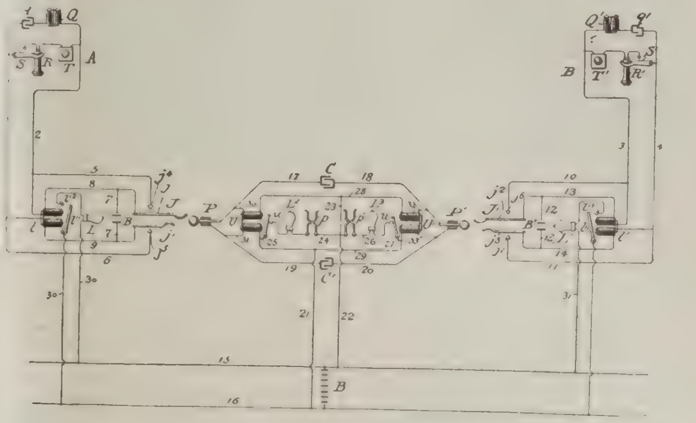
IMPROVED HOOK SWITCH.

Wm. Kaisling, of Chicago, Ill., patents (No. 738,813) and assigns to the Stromberg-Carlson Telephone Mfg. Company, of Chicago, an improved hook switch. The object of this invention is to provide a more reliable and more compact switching arrangement for subscribers' sub-stations. It is shown in the figure. Upon the back board *6* of the wall set the condenser *7* is secured by means of a bracket *8* and clamping piece *9*. This clamping piece supports the hook switch and the induction coil. The hook switch *14* is pivoted at *13*, and at *19* there is a rubber roller which is so arranged as to open the springs *20* that form a switching device when the receiver is lifted from the hook switch.



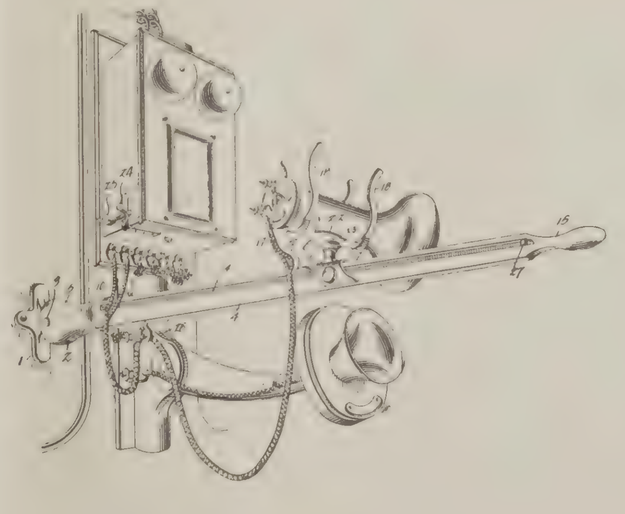
SWITCHBOARD CIRCUIT.

Stanley A. Duvall, of Chicago, Ill., patents (No. 738,780) an improved switchboard circuit. This invention has for its object the simplification of telephone circuits and the improvement of their talking properties by the removal as far as possible of all coils. This invention is illustrated in the figure. From the subscriber's station *A* the lines *1* and *2* run through the two halves of the relay *l* to the jack springs *J*. Across the line is the battery *B″*; when the receiver is removed from the hook current flows from this battery, excites the relay, closes the armature *l″*, and lights a lamp *L*. When the plug is inserted the relay is short circuited by the conductors *5* and *6*, and the line lamp extinguished. A double supervisory signal is provided by the relays *U* and *U′* which are in a bridge of the cord circuit and also form retardation coils to prevent cross talk in the common battery. As long as the receivers are off their hooks the relays *U* and *U′* are excited. The armatures *u* and *u′* are held by means of the relays *U* and *U′*.



ADJUSTABLE BRACKET FOR TELEPHONES.

E. J. Murphy, of Crandull, Tenn., patents (No. 739,202) an adjustable bracket for telephones. The object of this invention is to provide a simple, inexpensive and efficient bracket which may be secured to a wall near the sub station set and support the receiver. The device is shown in the figure, in which *4* is a lever pivoted upon a casting *1*, that is bolted to the wall. On this lever there is a carriage *6* which slides to and fro, and in which the receiver is supported by the arms *18*. The operation of this invention is readily seen from the illustration.



UTICA HAS 2,140 INSTRUMENTS.

At present the Utica Home Telephone Company, of Utica, N. Y., has 2,140 working telephones. All of the long distance lines are now in operation, with the exception of the one to Trenton Falls, which will be in operation at an early date. The switchboard at the Home Company's exchange has a capacity of 12,000 telephones.

The Week's Messages.

FINANCIAL

BROOKSVILLE, FLA.—The Brooksville Telephone Company, which has been organized for about three months, has declared a dividend of 3 per cent. to the stockholders, and 9 per cent. for improvements. The line is now being built to Bay Port.

NEWTON, IA.—A special meeting of the stockholders of the Jasper County Telephone Company was held in this city. By unanimous vote it was decided to increase the capital stock from $100,000 to $150,000. This was done in order that the company might take in six additional lines that have been organized.

LACONIA, N. H.—A meeting of the stockholders of the Citizens Telephone Company of this city was held recently, at which it was voted to increase the capital stock of the company $10,000, making $70,000 in all.

MORRIS, N. Y.—The Butternut Valley Telephone Company, of Morris, Otsego county, has increased its capital stock from $3,500 to $6,000.

ROCHESTER, N. Y.—At a meeting of the directors of the Stromberg-Carlson Telephone Mfg. Company, the regular quarterly dividend of one and three quarters per cent. on the preferred stock and two and one-half per cent. on the common stock was declared payable October 1st.

COVINGTON, O.—The Covington Home Telephone Company, of Miami county, increased its capital stock from $20,000 to $30,000.

GERMANTOWN, O.—The Germantown Independent Telephone Company has increased its capital stock from $2,500 to $10,000.

PHILADELPHIA, PA.—The net earnings of the Keystone Telephone Company for August amountued to $20,755.

FRANCHISES

FLORENCE, ALA.—The city council has granted a franchise to the Staunton Telephone Company to erect poles and run wires on the streets of this city. The line begins in Savannah, Tenn., and runs through Waterloo, in this county. It has been completed as far as Waterloo.

GALESBURG, ILL.—The Fremont Telephone Company has asked permission to construct a line commencing at the city limits of Galesburg at Fremont street to section 9 of Knox township.

PEORIA, ILL.—At a session of the board of supervisors the Dunlap Telephone Company was granted a right of way along the highways in the townships of Radnor, Akron, Medina, Kickapoo and Jubilee.

INDIANAPOLIS, IND.—Through S. P. Sheerin, president, the Long Distance Telephone Company, of Indianapolis, has applied to the county commissioners for an additional franchise through Howard county.

HENRYETTA, I. T.—The Independent Telephone Company has been granted a franchise by the city council. They expect to put in a double metallic circuit, and have it in operation by January 1, 1904. W. T. Harris is manager of the concern.

SHELBY, IA.—The Shelby Independent Telephone Company has been granted the privilege of erecting telephone lines along the highways in Pottawattamie county.

SHELBYVILLE, KY.—The council has passed a resolution to the effect that as the Cumberland Telephone & Telegraph Company has not complied with its franchise contract, the franchise shall be sold for another system, the purchaser to begin work within sixty days from purchase. The central energy system must be used.

PERSONAL

ANDY AUSTIN has secured the position of wire chief with the Stark Telephone Company, at Alliance, Ohio. Jack Barnes, the present incumbent, has secured a position in Canton.

W. P. BEARDSLEY, lately district superintendent of District No. 6, United Telephone and Telegraph Company, has been promoted to be superintendent of District No. 11, with headquarters at Harrisburg, Pa. Mr. Beardsley is succeeded by Mr. N. E. Robb, of Bellefonte, Pa., who will have charge of District No. 5, which is composed of Districts Nos. 5 and 6 consolidated, and the headquarters will be moved to Bellefonte. Mr. Frank McCormick, of Lock Haven, has arrived in Altoona and has assumed charge of the Altoona plant as manager.

MR. W. D. DE VARNEY, superintendent of the Topeka & El Reno Telephone Company, with headquarters at El Reno, Okla., has just returned from a trip to Kansas City.

A. E. DOBBS, formerly of the AMERICAN TELEPHONE JOURNAL and late of *Sound Waves*, has accepted the position of superintendent for the B-R. Elec. & Telephone Manufacturing Company, of Kansas City, Mo.

MANAGER H. A. DOUGLAS of the Citizens Telephone Company of Jackson, Mich., and E. E. Lentz, of Detroit, visited the officials of the Citizens Telephone Company at Grand Rapids recently.

MR. EWING, who has been the manager for the Emporia Telephone Company, of Emporia, Kan., for the past year, has resigned. Mr. Olin Jones succeeds him.

CHARLES A. JANKE, who since 1882 has been district manager of the Delaware & Atlantic Telegraph and Telephone Company in Camden, has been promoted to the claim department of the Bell Telephone Company in Philadelphia, Pa. H. F. Ettinger will succeed Mr. Janke as district manager.

CHARLES T. MERTZ has been promoted to a position as inspector for the Interstate Telephone Company in Trenton, N. J.

E. D. MILLER has sold his interest in the telephone plant at Bicknell, Ind., which plant he built and of which he was manager and has resigned his position with the company to accept the position of wire chief with the Davis County Home Telephone Company, of Washington, Ind.

MANAGER FRANK REIFSNIDER has resigned his position with the Urbana (Ohio) Telephone Company. Mr. Reifsnider's resignation was prompted by ill health. Carl Ross, recently graduated from the Urbana Business College, has taken a position in the office as assistant to Mr. Reifsnider with the idea of mastering the details of the office.

C. W. SEBERN has tendered his resignation as general manager of the Lawrence Telephone Company, of Ironton, Ky. Mr. Sebern will continue the management of the Catlettsburg and Ashland, Ky., plants. Improvements will be made and also extensions put on the line.

I. E. SPRINKLE, of Defiance, O., has taken charge of the Coshocton, O., Central Union Telephone exchange, vice J. Calvin Merrell, who goes to Nelsonville, O.

F. C. WARD, manager and owner of the Cooperstown, N. Y., and Richfield Springs, N. Y., Independent Telephone Company, was in Utica recently. The private and public lines of the Utica Company from Utica to Trenton Falls have been completed.

ELECTIONS

DECATUR, IND.—The annual election of the Citizens' Telephone Company was held at the office of F. M. Schirmeyer. The board as elected is John W. Tyndall, F. M. Schirmeyer, E. X. Ehinger, Henry Hite and John Baker.

VINCENNES, IND.—At the annual stockholders' meeting of the Home Telephone Company, W. H. Vollmer, Charles Bierhaus, D. A. Yoder, E. E. Newman, I. E. Gardner, W. H. Pennington and R. E. Purcell were elected directors. The directors elected W. H. Vollmer, president; Charles Bierhaus, vice-president; I. E. Gardner, secretary-treasurer.

DAVENPORT, IA.—The officers and executive committee of the Farmers' Mutual Independent Telephone system were elected at a meeting held recently, and are as follows: President, James Swartz, of McCausland; secretary, Dr. F. C. Skinner, of LeClaire; treasurer, R. K. Brownlie, of Long Grove; executive committee, William McGinnis, of Argo; Dr. F. C. Skinner, of LeClaire; W. J. Peaslee, of Princeton; P. H. Damm, of Low

THE WEEK'S MESSAGES—Continued

Moor; J. A. Anderson, of McCausland; Dr. George B. Maxwell, of Long Grove, and Hon. M. H. Calderwood, of Eldridge.

YORKTOWN, N. Y.—The Yorktown Telephone Company, has elected the following officers: President, James Rice; vice-president, Theodore Tompkins; secretary, Edward Kear; treasurer, Munson Frost. F. D. White, James Strang, Albert Lee, James Mead and Cornelius Pugsley are directors.

WOODSFIELD, O.—The Woodsfield Telephone Company recently reorganized by electing the following officers: J. B. Rhodes, president; P. E. Farley, secretary and treasurer; Dr. F. C. Huth, general manager; J. B. Crim, superintendent; L. E. Stregner, superintendent of construction.

CHATTANOOGA, TENN.—The stockholders of the Hamilton Telephone & Power Company met recently at the manufacturers' association and perfected the organization by electing the following officers and directors: President, Z. C. Patten; vice-president, C. D. Mitchell; secretary, E. Y. Chapin; treasurer, M. Llewellyn; directors, Z. C. Patten, H. S. Chamberlain, L. J. Sharpe, M. Llewellyn, Chas. Rice, C. D. Mitchell, J. S. Trigg, John Shamotulski and E. Y. Chapin.

UNDERGROUND

SAVANNAH, GA.—At a meeting of the board of directors of the Georgia Telephone Company it was decided to lay an underground conduit.

OSWEGO, N. Y.—There is a movement in this city for putting all telephone, telegraph and electric light wires underground. It is said that the arrangements will be made for the work this winter. Both the telephone companies consent to the change.

RATES

PAXTON, ILL.—The Central Telephone & Telegraph Company has made a satisfactory working arrangement with the Dix Telephone Company by which the price of communication between Elliott and Gibson has been reduced from thirty cents to fifteen cents.

GRAND RAPIDS, MICH.—The Citizens' Telephone Company will advance rates to the full limit allowed under the ordinances on January 1.

MISCELLANEOUS

EMINENCE, ILL.—At the annual meeting of the Eminence Telephone Company the old officers were re-elected except one director, B. E. Gaddis, who declined to serve longer, and in whose stead J. S. Adams was chosen. The company not being out of debt, each stockholder was assessed $10 for the ensuing year. Mr. Frank Reise will take charge of the central office in Atlanta, Oct. 1st.

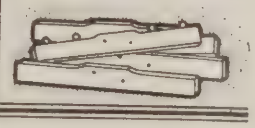
INDIANAPOLIS, IND.—The state tax board of Indiana sustained the appeals of some of the telephone companies of that state against the assessments made by the county boards. The boards fixed the assessment of the Delaware and Madison Counties Telephone Company at $80 a mile; South Bend Home Telephone Company, $90 a mile; Steuben County Farmers' Telephone Company, $20 a mile; Home, of Elkhart, $160. The total valuation for taxation of telephone companies in Indiana is $6,739,691.

PLAINFIELD, IND.—The Plainfield Telephone Company has filed with the Secretary of State a certificate showing the change of firm name to the Consolidated Telephone Company.

BOSTON, MASS.—Pursuant to the decree of the foreclosure entered by the Circuit Court of the United States for the Eastern District of Michigan, the property of the Michigan (Bell) Telephone Company will be sold at Detroit on November 4 by Walter S. Harsha, special master.

DETROIT, MICH.—The Co-Operative Telephone Company has opened exchanges at Elm, Stark and Nuremberg, three villages in Wayne county which have never had telephone service of any kind heretofore. The company is also able to give service to Trenton, by making a roundabout circuit of over 200 miles by way of Lansing.

New Construction in the Field



DANVERS, ILL.—The Danvers Telephone Company has been granted the right to construct a line in Little Mackinaw township.

GRAYVILLE, ILL.—W. F. Westfall, manager of the Independent Telephone System, is arranging to extend his telephone line of Carmi. His system now reaches a point about five miles north of Carmi. The Carmi city council has granted Mr. Westfall permission to erect and maintain a telephone system in Carmi.

ROCK ISLAND, ILL.—The Union Electric Telephone Company has ordered the material and will in a few days commence the construction of its line to Milan to connect with the rural lines at Milan.

ANDERSON, IND.—Marshall Walker, of Monroe township, is here and says the finishing touches are now being put in the farmers' telephone line in his neighborhood. The company was organized by Mr. Walker. The line extends east and north of Alexandria and has forty-three subscribers. It will connect up with the Delaware and Madison county line at Alexandria.

LANAPAH, I. T.—The Lanapah Telephone Company has secured a franchise for a telephone system at Lanapah, and will push the construction work ahead at once.

STRONG, ME.—The West Freeman Telephone Company has extended its line to Strong.

ALLEGHANY, MD.—The Big Savage Mountain Fire Brick Company, of Alleghany, has just had installed a composite telephone and signal line, from Office to Fire Clay Mine on Big Savage mountain.

LUDLOW, MASS.—An effort is being made to establish a local telephone line in town, and L. F. Dow, of Northampton, is convassing for subscribers to the project.

POTTERVILLE, MICH.—An exchange of ninety-seven telephones has just been put in operation here by the Citizens' Telephone Company. More subscribers will be connected as soon as supplies arrive.

COLUMBIA, MO.—J. A. Hudson, owner of the local telephone plant, was in Chicago recently and bought three new switchboards. Two of these new boards are to be used exclusively for long lines. Mr. Hudson is building between forty and fifty miles of new lines into the country, and is adding a large number of new telephones in town. In addition he is having to rebuild several old lines where many of the poles have rotted and are falling down.

SCHENECTADY, N. Y.—The Schcenectady Railway Company has awarded the contract for equipping its Albany and Troy lines with a telephone system. This system will permit of the use of portable telephones, which will be carried on all the cars.

OAKGROVE, MO.—W. T. McLaurine, owner of the Oak Grove telephone exchange, reports that he has had to add an additional section to his switchboard.

CLEVELAND, N. Y.—E. P. Sanders has secured about twenty subscribers for a local telephone exchange in Cleveland.

WHITE CREEK, N. Y.—The White Creek Telephone Company has poles set and expect to string up the wire in a few days. They will reach from Eagle Bridge to White Creek Centre.

MARION, N. C.—The Independent Telephone Company has recently bought a new 200 drop board and office equipment, which will improve their service. Mr. J. D. Blanton is the owner.

MORGANTON, N. C.—The Local Telephone Company has recently bought a new 200 drop board and office equipment, enabling them to give improved service. They are also overhauling their outside lines.

McCOMB, O.—The Farmers' Mutual Telephone Company will erect its line between McComb and Benton Ridge.

MORNING SUN, O.—The Morning Sun Telephone Company, which was recently incorporated with a capital stock of $10,000, will shortly start work on constructing lines from Morning Sun to Oxford, Fair Haven, College Corner and Camden. The organizers of the company are R. H. Douglass, W. M. Cook, J. R. McCleary, S. M. Paxton, S. C. Weed.

NEW PARIS, O.—H. G. Bloom is rebuilding his telephone line from the exchange to near the Miller school house.

SPRINGFIELD, O.—The Home Telephone Company's new building at Springfield, O., is nearing completion, the terminal rack has arrived and will be placed in position at once. The company will have their exchange in full operation not later than Nov. 15th.

WELLSBURG, O.—The Wellsburg Home Telephone Company will build a line to Glenova, where it will connect with the National Telephone Company's line. A line is also to be constructed from Brilliant to Martin's Ferry in the near future.

PONCA CITY, O. T.—The Miller brothers of the "101" ranch and others have constructed a telephone line from Bliss, White Eagle, the Ponca agency and other points to connect with the Pioneer Telephone Company's lines here.

CLEARFIELD, PA.—The Huntingdon & Clearfield Telephone Company has authorized the construction of a line from Clearfield, which will take in Mahaffey, Glen Campbell, Arcadia, Barnesboro, Hastings, Spangler and Carrolltown. It is also expected that the company will give service to Pittsburg and possibly Philadelphia via Johnstown.

TRADE NOTES

The F. Bissell Company, Toledo, Ohio, has originated a new Spider Wire Cleat, which is made of tough maple and is attached to the underside of the crossarm by screws or nails. It is drilled for 5 wires bringing all spider wires to the pole in compact form, yet each wire remains separate and distinct and can be easily traced. The spider wires can be carried down the pole with Insulated Bridle Rings. By this method the cable pole can be made as neat in appearance as any other pole and the danger of damage to insulation of wires is reduced to a minimum. This appliance is inexpensive and will prove an attraction for managers of exchanges and those interested in telephone construction. Prices, samples and descriptive matter will be sent for the asking.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

TELEPHONE SYSTEM. Telephone system in Northwest Arkansas, 200 miles in operation, 325 subscribers, 200 miles extension needed immediately. No Competition. Excellent connections can be had with Indian Territory, Joplin, Springfield and other Missouri points, also Little Rock, Arkansas. This line is key to the situation. Pays 15 per cent. annually, best prospects to pay 25 per cent. inside of a year. Boom in progress. Three new railroads building, also electric line and two other roads under survey. Lack of transportation has heretofore retarded the growth of the country. Good reasons for selling. Address, HERMAN H. VER MEHREN, 633 Paxton Block, Omaha, Neb.

CONTROLLING INTEREST.—For sale, in a good southern town of 10,000 population, the controlling interest in an up-to-date new exchange of 600 subscribers. Rates, $2.00 and $3.00 per month. Address, Box 87, The American Telephone Journal, 116 Nassau Street, New York City.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

POSITION.—Competent telephone man desires position as Superintendent or Wire Chief. Has had 13 years' experience with Bell and Independent companies. Best of references furnished; 32 years of age; married; temperate; industrious. Address F. H. CURTIS, 196 Bleeker Street, Gloversville, N. Y.

ACCOUNTANT.—Wanted, first-class acountant and bookkeeper to take charge of a large Independent Telephone Company's office and books in Pennsylvania. Address, Box 88, The American Telephone Journal, 116 Nassau St., New York City.

POSITION. A No. 1 telephone engineer desires good connection with telephone company in Ohio or Indiana. Technical graduate. Large experience in all branches. Best of references furnished. At present electrical engineer for large telephone company in the east. Address, Box 86, The American Telephone Journal, 116 Nassau St., New York City.

TOLL TICKETS FOR SALE.—You use them every day. 5,000, printed in three colors, excellent design, prepaid, $2.50. Cash with order. The American Telephone Journal knows we are O. K. Ask for samples. GILDART BROS., Albion, Mich.

POSITION.—Thoroughly experienced telephone manager now successfully operating 500 line common battery plant, desires position with progressive Independent company. Best references from present and former employers. Address, Box 82, The American Telephone Journal, 116 Nassau Street, New York City.

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and All Kinds of Telephone Line Construction Material.

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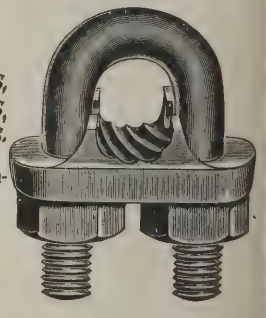

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Published every Saturday and entered at the New York Post Office as second class matter. $1.00 a year, foreign $3.00 a year. Single copies 10 cents.

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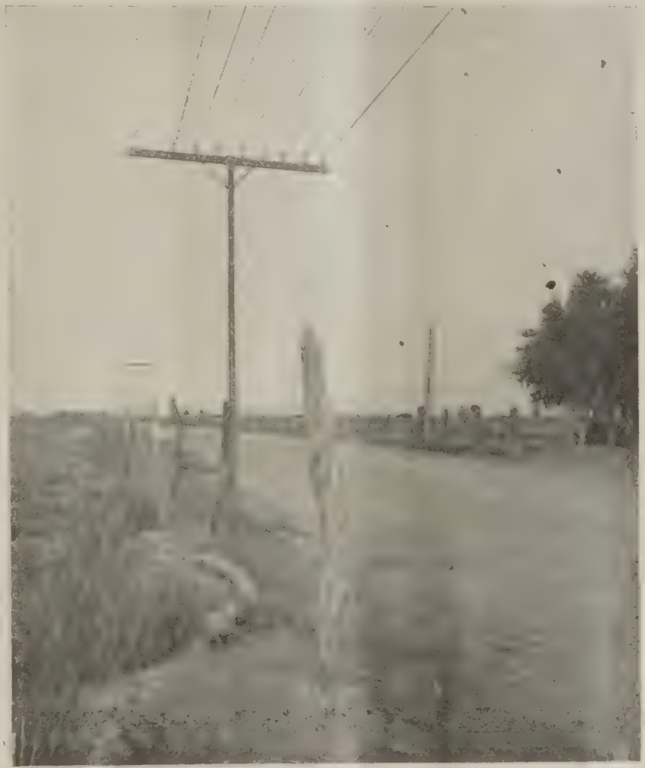
VOLUME VIII *SATURDAY, OCTOBER 3, 1903* *NUMBER 14*

AN IRRIGATION CANAL TELEPHONE SYSTEM



Locomotive Boiler Flue Telephone Pole.

IN some of our Western States there are thousands and thousands of acres of the most fertile land which is unproductive for the reason that the rainfall is so slight that nothing will grow on it except sage brush, cactus and a few other hardy plants. Of late years there have been great efforts made to make some of this land bear products by bringing water in artificial canals from some river where a dam had been constructed and distributing it by means of smaller ditches over these arid tracts. In some cases the government has undertaken this work and has thereby rendered profitable great areas which otherwise would be parching in the sun.

These once arid spaces are now green, largely with alfalfa, a hardy plant of the clover family, which thrives in the western dry climate, provided it is given sufficient water. The water is brought to the fields in smaller ditches which branch from the main canal. While some of the canal building and reservoir constructing has been done by the government a great deal of it is handled by private corporations who, by building a canal into a promising country and selling the water from it to the nearby ranchers, are able to realize well upon the investment.

As of necessity the canals are built upon high ground, if a gap would break in the side of one of them, the result would probably be serious, as the water flowing out would rapidly wash away a large channel in the side of the canal which would cost considerable to repair, beside this, there would be much damage done by the escaping water to the surrounding fields, to say nothing of the possible loss of life. For this reason the companies constantly keep men on duty patrolling the canals, who, if any break is noticed, repair it if it is in their power, or if the break be too large for the man to handle, he secures the necessary help as quickly as possible. In many cases the canals run for miles through sparsely populated localities where it would be impossible to quickly secure enough help to repair a break of any consequence. For this reason it was often necessary for the canal patroller, in case of an accident, to walk miles for help, which consumed time, and all the while he was doing this the water would be washing through the gap it had cut and making it wider.

Irrigation canal men were not slow to realize that a line along the canal with telephone stations at convenient points would offer the simplest and best means of enabling the patroller to report any accident to the headquarters of the company, from which

Central Office of Buckeye Canal Company.

Line Showing Flue Post and Telephone Box on Canal.

Two Fourteen Foot Flues Spliced for Rroad Crossing.

point any assistance or tools could be expeditionally dispatched. Another point of value that the irrigating canal telephone system possesses is that it enables ranchers to notify the headquarters of the amount of water that they probably need for the next few days to come. Formerly this information was acquired by an order man, who rode along the canal and made the necessary inquiries of the ranchers, but now this is all done by telephone.

The high estimate, of the value of a telephone seystem, that irrigation men hold can be judged from the statement of Mr. James R. Thorpe, who is an authority on irrigation matters and president of the Buckeye Canal & Land Company, a large corporation which has its offices in Phœnix, Arizona. Mr. Thorpe says: "The telephone is as necessary to the operations of irrigating canals as the telegraph is to railroads."

The Buckeye Company has a complete telephone system covering its field. In building up a telephone system in the far away west many difficulties are encountered with which the eastern telephonist does not have to contend. Being so far away from the base of supplies is an unestimable disadvantage. The Buckeye Company successfully overcame every obstacle which presented itself, and now has a system to be proud of. The cost of lumber or poles delivered was such as to be entirely out of the question. They would have to be hauled over "the hot sands" for an average distance of 35 miles, and as teaming costs money, it would add an almost unheard of sum to the initial cost of the poles. Apparently every possible method of building a pole line was considered, and because of the cost of material, excessive railroad freights or hauling, each was impracticable, and things looked dismal for the constructors.

At this crisis the ingenuity of Master Mechanic Todd, of the Santa Fe Railroad, was appealed to, and after a slight consideration he offered a suggestion which made the building of the system possible. He proposed that instead of using wooden poles, as had originally been advised, that steel ones be used, and instead of sending to some eastern city for them, that they be taken from the scrap heap of discarded boiler flues at railroad shops. In other words, Mr. Todd intended to make use of the apparently useless boiler tubes which had been thrown out by the railroad company to rust away. Such poles would have the advantage of lightness, durability, and low cost. Cheap delivery also came in as an item, as a nearby railroad shop furnished 1,400 of these poles, which were practically delivered, so far as railroad freights were concerned.

The flues, which are two inches in diameter, fourteen and sixteen feet long, and of the best of steel, were flattened at one end, and drilled to provide for the cross arm and brace bolts. They were then tarred at the lower end and set for a distance of two feet in the ground. A line of more true and symmetrical appearance than one built in this way cannot be imagined.

The photograph shows clearly the details of one of the poles which is carrying four circuits. Instead of climbing these poles with the regulation climber, which proceeding would seem hardly practicable, a piece of rope is used with two loops in it. One loop is placed around the pole and in the other the foot of the man climbing is put, and by using the old method, that all boys are familiar with, of drawing up the loop on the pole and allowing it to bind by putting the weight of the body on it, then holding fast and taking another hold, the lineman works his way up the pole.

Where it was advisable to use a higher pole than ordinarily to cross a road two fourteen foot lengths of the boiler tube were spliced together. The circuits are metallic, with the exception of one thirty mile circuit, which is duplexed. This is used for private company business, and has an alarm device attached to notify the headquarters office of any unusual rise or fall of water in the reservoir. For instance, if a break or leak in the dam should occur the headquarters as well as the station at the dam would be instantaneously notified and all the men necessary to make a quick repair could be called by telephone and ordered to the point of the accident, where the trouble could be remedied.

CIRCUITS AND WIRING OF A SMALL MAGNETO SWITCHBOARD

By A. Dallam O'Brien.

THE circuits of a small magneto switchboard are few in number, and are usually simple in character and offer few difficulties in the way of maintenance. In considering the circuits which must be provided, the size of the office must be taken into account, and in the present instance we will consider an office having an equipment of one 100 line section of board of the type described in a recent article, and, in addition, will consider that at some future time, the growth of the system will necessitate the installation of two additional sections. Then the following circuits will be necessary:

1st.—The connecting cord circuit.

2nd.—The subscribers' line circuit.

3rd.—The ringing circuit, in which provision must be made, so that subscribers can be signalled either by ringing current, furnished by the hand generator, located in the switchboard, or else by power from a pole changer or ringing machine.

4th.—The operator's telephone circuit.

5th.—A circuit which will enable the different sections of the switchboard to be connected together.

The cord circuit, for a board of this type, consists of a pair of connecting cords and plugs, a ring-off drop and a combination ringing and listening key. The wiring diagram for this circuit is shown in Fig. 1. The cords themselves contain two conductors which are connected to lugs screwed into the cord shelf. From this point a cable of No. 22 switchboard wire is formed, and led along the bottom of the cord shelf and the side of the switchboard into the keyboard. The pairs of wires at the shelf are connected to the cord terminal lugs, and in the keyboard, those wires which have been connected to the front cord terminals are connected to the middle springs of the ringing key, and those connected to the back cord terminals are soldered to the inner springs of the key.

Formed with this cable and running with it, along the cord shelf, is another cable, the wires of which are soldered to the back cord terminals. This cable leaves the keyboard cable when it reaches the side of the switchboard, and its wires soldered to the terminals of the ring-off drops, thus connecting the drops permanently across the back cords. The inner contacts of the ringing key are connected by short wires to the inner contacts on the listening side of the key. The outer contacts on the listening side of all the keys are strapped together by a pair of wires. In the keyboard, these wires are connected to the operator's set. These two wires in the keyboard are known as the listening straps. In the same way, the outer contacts, on the ringing side of the keys, are connected together and the connecting wires soldered to a pair of leads coming from the source of ringing power. These connecting wires are known as the ringing straps. The strap wiring is usually done with No. 18 tinned copper wire. The straps are insulated between keys by a covering of corset lacing dipped in shellac, the insulation being put on during the wiring.

In practice, the operator answers all incoming calls with the back cord, because the back cord in use, it is not necessary for the operator to reach around a cord when ready to make a call, as the front cord is disengaged and at hand. It is for this reason that the ringing key is connected to the front cord and that no provision is made for signaling with the back cord.

Before considering the operation of this circuit, it will be well to examine the subscribers' line circuit, which is shown in Fig. 2. The wires leading from the subscribers' station enter the central office, pass through protectors at the cable head, and are led by 20 pair switchboard cables to the lower side of the connecting rack. Here they are cross-connected to the upper half of the rack, and are led to the switchboard in a cable, the pairs of which are fanned out and soldered to the outer springs of the 4 point jacks. From the inner springs of the jacks, another cable is led to the line drops, where its pairs are fanned out and connected to the drop terminals.

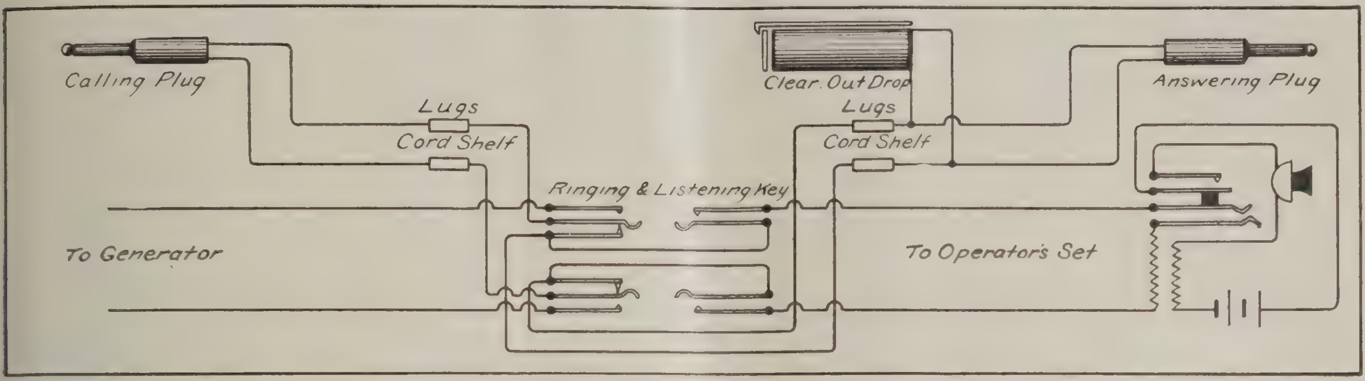


Fig. 1. The Cord Circuit.

It will be seen that, in its nomal condition, the circuit is complete from the sub-station through the line drop and back to the station. The method of operation is as follows: The subscriber, wishing to make a call, signals the operator by means of the hand generator, sending an alternating current over the line and through the line drop, which notifies the operator. The operator answers by placing the answering plug in the jack of the calling line and throwing the key to the listening position. Having received the necessary instructions, the operator places the calling plug in the jack of the line desired, throws her key to the ringing position, and which signals the called for subscriber.

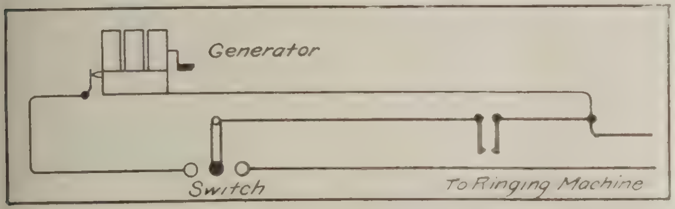


Fig. 3. Generator Circuit.

The operator supervises the connection until conversation is started, and also before disconnecting. Conversation being finished, the subscribers hang up their hand telephones, give a few turns to the hand generator. This sends current over the line and through the ring-off drop in the cord circuit. The line drops, in a board of this kind, may be either of the 500 ohm tubular type, or the less expensive 80 ohm unenclosed drop. The ring-off drops, however, are permanently bridged across the cord circuit, and offer, at all times, a short circuit for the talking current, and thus these drops should offer a high impedance. For this reason, the ring-off drop is a 500 ohm drop completely enclosed in a tubular metal shell. To enable the different positions to be handled by one operator, it is necessary to arrange the operator's telephone set, at each position, to be connected to the cords at all other positions. Probably the simplest and easiest way is to mount, on the face of the board, a number of switching keys. In the present instance three positions will require two keys.

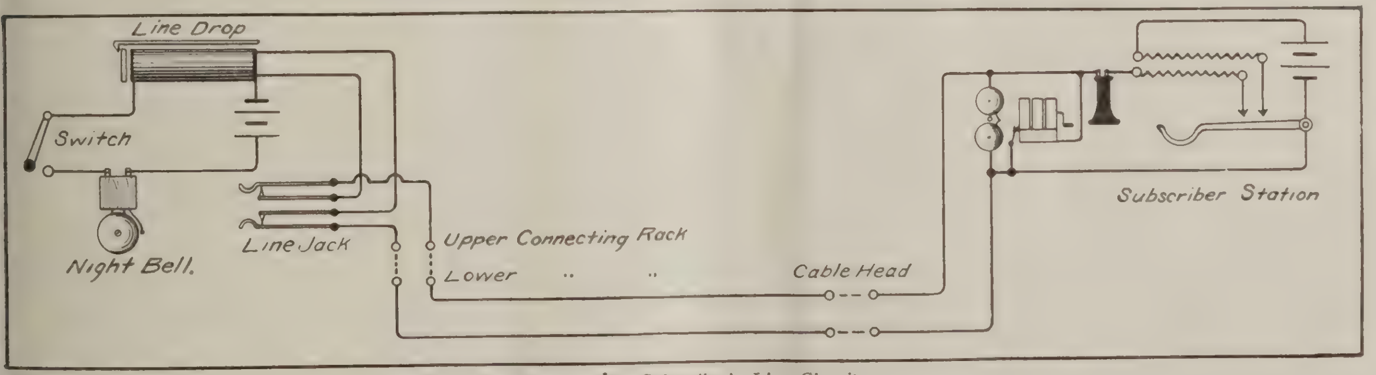


Fig. 2. The Subscriber's Line Circuit.

The method of wiring to these keys is shown in Fig. 4, where the pairs of leads marked *To position 1, To position 2,* and *To position 3,* represent continuations of the keyboard listening straps at the different positions. It can be seen that, by throwing key *1,* the listening straps of positions *1* and *2* will be connected together, and that by throwing key *2,* the listening straps of position *3* will also be added to the combination, and that all three positions may be operated from any one position.

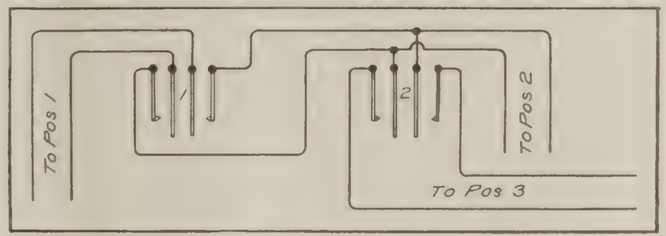


Fig. 4. Operator's Telephone Keys.

In Fig. 3 is shown the method of wiring the ringing circuit, so that either the power or hand generator may be used. The leads from the ringing machine are brought to the switchboard, and terminated on lugs mounted on the lower half of the connecting rack; from this point a wire is led to the keyboard and connected to one side of the ringing key strap. The other side of the ringing key strap is connected to the lever of the switch, which is mounted on the board near the hand generator. One contact of the switch is connected to the free power lead at the connecting rack. The other contact is connected to one side of the hand generator. The free side of the hand generator is connected to the ringing key strap, as shown in the diagram.

Fig. 3 shows that when the switch lever is thrown to the right, the ringing current furnished to the board will come from the source of power, and when the lever is in the left hand position, the hand generator will be connected. As shown in Fig. 2, there is provided a night bell circuit, consisting of a bell, batteries and switch, by means of which the circuit may be rendered operative or not, as the occasion requires. The purpose of the night bell is to call the operator's attention to an incoming call at times when the operator may be at a distance from the switchboard, or owing to a small amount of business, be engaged in other work. The falling of a drop shutter closes the circuit through the bell, which continues to ring until stopped, either by restoring the shutter or opening the switch.

The arrangement of the operator's telephone circuit is shown in Fig. 1. The primary circuit is closed when the receiver plug is inserted in the receiver jack, and consequently current is drawn from the batteries only during the time that an operator is at the position. Where closed circuit batteries are used in the transmitter circuit, it is not necessary to use a receiver jack. The battery may be connected directly to the transmitter, and the primary winding of the induction coil and the circuit kept closed.

THE NORTHEASTERN IOWA CONVENTION

A DISCUSSION of the farmer line question was one of the principal features of the semi-annual convention of the Northeastern Iowa Telephone Association, which was held in Cedar Rapids, Iowa, on September 25, in the rooms of the Commercial Club. There was a wide difference of opinion on the matter. J. E. Keelyn, of Chicago, thought that the time is rapidly approaching when it will be possible to give the farmer telephone service for four or five dollars a year. Others were of the opinion that at least three times that amount should be paid. There was much discussion but no agreement could be reached. A number of other interesting subjects were taken up. The meeting was well attended, enjoyable and profitable. The feature of the morning session was the happy address of Secretary Sessions of the Cedar Rapids Commercial Club, welcoming the telephone men to Cedar Rapids.

In the afternoon the session was called to order by the president, Vic. Stevens, of Dubuque, at the Commercial Club rooms, at 1:30. The chief business of the meeting was the reading of two papers and a discussion of the farmer subscriber question. Something of a sensation was precipitated by the statement of O. W. Rogers, of New York, formerly a lawyer, but now interested in the telephone business. He announced that, backed by a company composed of James S. Clarkson, of New York, Senator Charles A. Towne, of Minnesota, the Blanchards and others, he was going to start, in Fayette county, to standardize the Independent companies. The system will include long as well as short distance lines. Mr. Rogers proposes some new scheme, whereby current is to be supplied by dynamos instead of batteries. His proposals are looked upon with some suspicion by most of the Independents.

One of the best of the addresses was an extempore speech by E. Duke Naven on "Where Are We At," concerning the question of co-operation on the part of the Independent managers. Personal advantage, he said, should be sunk in the advantage of the whole Independent movement. The telephone system is a trial ground for the survival of the fittest. Every man has been for himself and for himself alone; antagonism and misunderstanding has been rife. Mr. Naven thought that the time would come when there would be only a few, perhaps only one, Independent telephone system in that part of the state. The present bickering and bad feeling, in his opinion, weakened the whole Independent situation and the Bell people were not slow to take advantage of this. If the Independents would adopt rules and regulations that all would subscribe to and then live up to those rules and regulations, he thought there would result a benefit to all those who are at present more or less at outs with each other. There is no money, he said, in such family quarrels, and telephone men are in the business first of all because of the money in it, and only secondarily because of the accommodation of the people. Instead of always watching each other and letting the devil take the hindmost, he held that the Independents should work together, strengthening their position all along the line.

Robert L. Parker read a paper on the future outlook, in which he commented on the need of improvement in the business methods of the telephone men. He held that the promoting of telephone systems was past, and that now capital should be invested in improvements; a fuller development of the system already in existence. He noted the tendency toward consolidation and considered it the proper line of development for the toll line, but was not prepared to say that the exchange business could be consolidated successfully.

Fred. Bishop, of Central City, read a paper on "Some Past Experiences," and was followed by a short talk from Dr. Bennett on "The Present Telephone Situation," who held that the prime essentials in the conducting of a successful telephone system were, first, quality, and second, capacity. Telephone men, he said, are as one on the question of when to use different materials, and that, though their contracts vary considerably, still they are slowly but surely getting toward a unanimity in their working and business principles. The time had come, he thought, when the association should be obligated to stand together. New companies are increasing in number and size, and for that reason among others he thought the present a good time to swear allegiance to the Northeastern Iowa Independent Telephone Association.

Some who were to give papers were not present, and the next matter brought before the meeting was the question of the farmer subscriber. The discussion was informal and the consensus of opinion seemed to be that the managers generally charged the farmers too little, though that opinion was combated strenuously by some of the men. It seemed so hopeless to come to any sort of agreement as to the proper rate to charge, especially when it is considered that conditions vary so in different localities, that the matter was allowed to lapse.

The meeting then adjourned until evening. W. V. Shipley, of Iowa Falls, was elected to fill the vacancy caused in the executive committee by the resignation of George T. Hughes, who had removed to Lincoln, Nebraska. The meeting was then given over to a discussion of toll-rates. The rates and distances of nearly every manager are different from those of others. The question of reducing toll on one system to ten cents was discusssed, but no satisfactory conclusion could be reached because of the varying conditions in different localities. One manager used the ten cent toll almost entirely and paid good dividends on the receipts from it. Others could not make such a rate pay. After an extended consideration of the matter the meeting adjourned.

While the session served to emphasize the difference in purpose and methods of the different managers and showed much lack of harmony in prices, yet it had a good effect in bringing the men into touch with one another and showed them what their relationship to each other is.

Among those who attended were:

C. J. Hoebel, Menominee, Mich., representing the C. J. Hoebel Pole Company.

M. McNeal, Jr., Des Moines, representing the Illinois Electric Company.

W. E. Doolittle, Lafayette, Indiana, Sterling Electric Co.

William Bowen, Des Moines, Stromberg-Carlson Telephone Manufacturing Co.

Otto Borchert, Milwaukee, Jules Andre and Louis Co.

James Keelyn, Chicago, Western Telephone Manufacturing Co.

Alfred Trempe, Des Moines, Electric Appliance Co., Chicago.

H. H. Coughlin, Chicago, Central Electric Co.
W. Conover, Chicago.
S. S. Lichty, Vinton and Benton County Telephone Co., Vinton, Ia.
H. F. Camp, Jones County Telephone Co., Anamosa, Ia.
W. S. Bowe, Marshalltown Telephone Co., Marshalltown, Ia.
W. V. Shipley, Central Iowa Telephone Co., Iowa Falls, Ia.
E. C. Hampton, Linn County Telephone Company, Marion, Ia.
Fred. Bishop, Bishop Telephone Co., Central City, Ia.
F. E. Outing, Center Point Telephone Co., Center Point, Ia.
S. E. Elgin, Jones County Telephone Co., Monticello, Ia.
J. T. Van Vors, Bedman Telephone Co., Independence, Ia.
D. E. Voris, Linn County Telephone and Telegraph Co., Marion, Ia.
Vic. Stevens, Dubuque Telephone Co., Dubuque, Ia.
R. L. Parker, Gladbrook Telephone Co., Gladbrook, Ia.
Will M. Traer, Gladbrook, Iowa.

TWO YEAR TECHNICAL COURSE AT LOWELL.

WITH the object of training artisans for the position of foremen it has been decided to substitute for the advanced courses which have hitherto been given by the Lowell Institute an evening "School for Industrial Foremen," to comprise at the outset two courses, one mechanical and the other electrical, both extending over two years. The Lowell Institute is located in Lowell, Mass.

The subjects in the first year for both courses will be practical mathematics, elementary physics and electricity, elements of mechanism and gearing, and drawing. The subjects taught in the second year of the mechanical course will be mechanics, valve gears, elements of thermodynamics, the steam engine and boilers, elementary hydraulics, testing laboratory steam and hydraulic laboratory and mechanism, and elementary machine design. The second year of the electrical course will include valve gears, elements of thermodynamics, the steam engine and boilers, steam laboratory, direct-current machinery, alternating currents, electric distribution, electrical testing and dynamo laboratory.

The first session will open in October and continue through April. The instruction will be given by means of recitations, lectures, drawing room practice, and laboratory exercises, and it will be given at the Institute of Technology by members of the instructing staff of that institution. To be admitted applicants must have a good knowledge of arithmetic, including the metric system, elementary algebra, plane geometry, and mechanical drawing. Like all courses conducted by the Lowel Institute, the instruction is free.

USE TELEPHONES INSTEAD OF FIRE BOXES.

IN Elmira, N. Y., the extensive use of telephones is in a way revolutionizing the fire department service of the city. At the present time there are in use over 3,000 telephones, according to the statements made by the managers of the two companies. An examination of the records of the Elmira Fire Department shows that telephones are being used largely in place of the fire alarm system. Since July 1 but one alarm of fire has been turned in in this city by means of a fire alarm box, while a number of calls for the fire department apparatus to respond to fires have been sent in by means of telephones. Never before in the history of the paid fire department has such a condition of affairs existed where only one fire alarm box has been pulled in nearly two months.

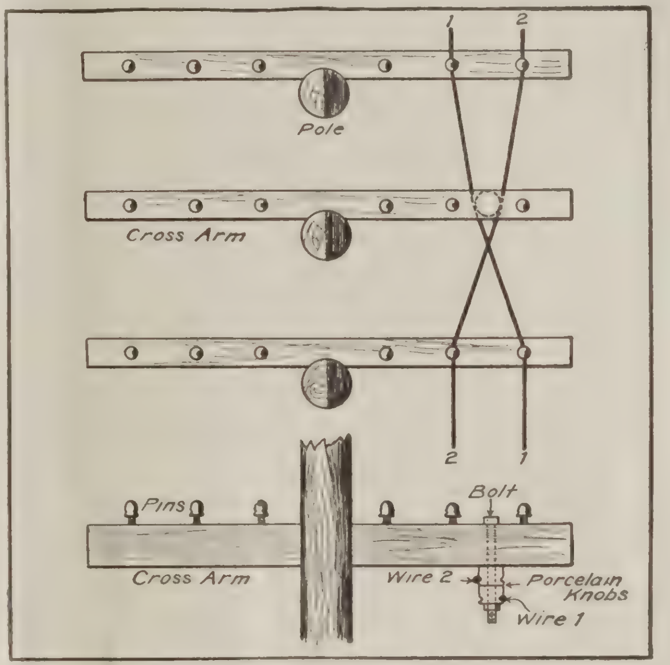
TELEPHONY IN ABYSSINIA.

EMPEROR MENELEK, of Abyssinia, it is stated, is establishing a complete telegraphic and telephonic system in that country. Both have been in operation for some years between the towns of Harar and Addis Abeba, and recently the seat of government has been connected by telegraph with Jibuti, on the Gulf of Aden. There are thus more than 500 miles of telegraph line already at work in the empire, and recent extensions will increase the total length of line in use to about 1,200 miles. A telephone system now connects Asmara with Barromedia by way of Adowa, and Addis Abeba with Ankober. The emperor has given permission to Italians to construct the line from Massowah on condition that it passes by Ankober, where political prisoners are detained. He receives daily reports by telephone from all parts of his empire. The southern frontier is not yet included in the system, but he has given orders that a telephone line 400 miles long shall be constructed there. The necessary material has already arrived in the country, and the work of construction will be carried on as rapidly as the conditions will permit.—*Electrical World.*

A METHOD OF TRANSPOSING WITH KNOBS.

By W. M. Lannan.

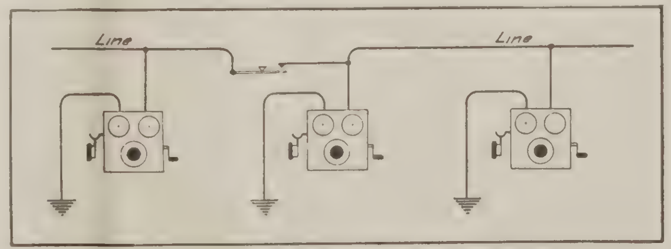
WHEN compelled by circumstances to use porcelain knobs on the underside of a cross-arm on which to support wires and it is desired to transpose, the method illustrated will be found to work well. The writer has found a 5/16 inch x 8 inch bolt and No. 4 porcelain knobs satisfactory. In putting the arrangement in place, bore a hole for the bolt through the arm, put in the bolt and then put on the two knobs and washer and tighten up the nut.

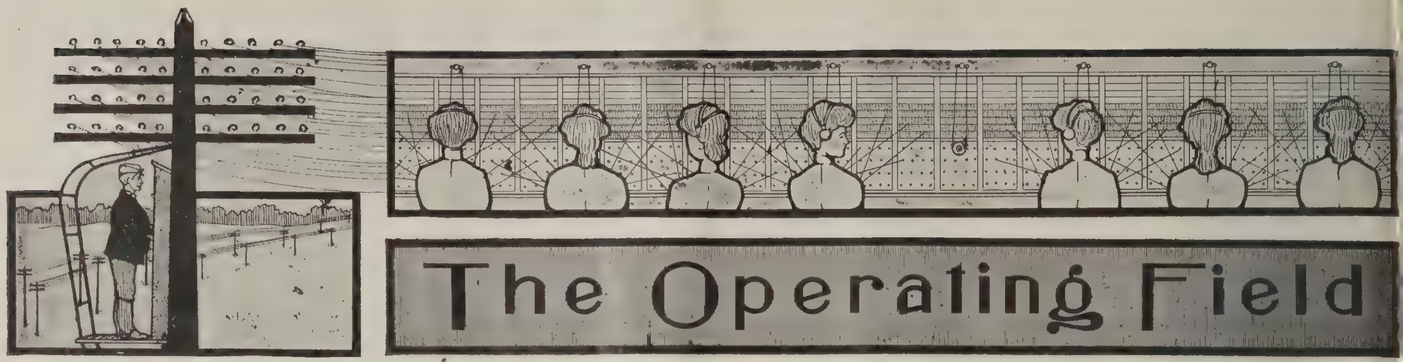


A SCHEME FOR A BRIDGING LINE.

By Chas. Claydon.

THE figure indicates the way in which the writer utilized a wire which otherwise might have gone to waste. Formerly a series telephone line was in use and two wires were run 500 yards from the road to the house in which the instrument had been placed. Bridging instruments are now being used. There are 12 of them and the line is 40 miles long. When the change was made instead of one of the wires being taken down a switch was installed as shown. When it is wished to ring toward town the button is pressed and the full strength of the current goes that way making a stronger ring.





The Operating Field

BELL TRIED TO BUY THE U. S.

It is learned on excellent authority that the Bell Telephone Company has made an offer for the purchase of the U. S. Telephone Company, the long-distance line of the Everett Moore syndicate, says *Finance*. It is said that the price named is $1,000,000 and the assumption by the Bell Company of the bonded debt as well as all other liabilities of the U. S. Telephone Company. In other words, it is said that the offer involved the purchase of the $2,000,000 of common stock, now owned by the Federal at $50 a share. The offer was declined, and will not be considered by the Federal Telephone Company or by the Everett-Moore syndicate for the simple reason that President Dickson considers that it would not be right to sell the property to the Bell interests, nor would it be justice to the Everett-Moore syndicate, as he believes he can make a great deal more money out of it than by selling it to the Bell. In fact, he believes that this company alone would eventually be able to pay, if necessary, the entire debt of the Federal Telephone Company.

Just why the Bell Company is so anxious to acquire this property is largely seen in the statistics of the telephone business in the State of Ohio. For instance, in Ohio there are 101 Bell exchanges in operation, with a total of 90,000 subscribers. The U. S. Telephone Company has 457 telephone exchanges in operation in the state with 130,000 subscribers. At least 20,000 of the Bell telephones are in Cincinnati and suburbs, where the U. S. Company has no exchanges whatever. Taking Cincinnati out of the running, it will be seen that the U. S. Company has more than twice as many telephones connected with it, and more than four times as many exchanges in operation. In other words, in the State of Ohio there are 356 towns and cities which may be reached only by the wires of the Independent Company.

Just how prosperous the U. S. Telephone Company is, and why President Dickson figures it will be able to pay large dividends on its common stock is seen in some figures which he has compiled. The U. S. Telephone Company now has 18,000 wire miles in operation, and an income of $360,000 per year, or $20 per wire mile. The outside operating expense is 60 per cent., or $12 per wire mile, leaving a profit of $8 per wire mile. The taxes and insurance are 52 cents per wire mile, leaving a net earning of $7.48 per wire mile. Just how much money this will run into is illustrated in the fact that to put in 25 aditional miles of wire between Cleveland and Toledo would cost $8,500. The interest on this money at 6 per cent. is $510.00, or $2 per wire mile. It has been shown previously that this company can operate and leave a profit of $7.48 per wire mile, which, after deducting $2 fixed charges per wire mile, will leave a profit of $5.48 per wire mile, which is nearly 18 per cent. on the money invested. In other words, President Dickson says that he can invest $200,000 of additional money in the U. S. Telephone Company with a net earning on the new money of 25 per cent., and what is more, said President Dickson, "we are going to have the money to make these extensions. I am not at liberty to divulge plans, but I will say that we are completing arrangements for securing every cent of money that the U. S. Telephone company needs.

"I notice the past week that the bonds of this company have been selling around 60 per cent., and I want to say to you that I consider these bonds of better security than any telephone or traction bonds I know of in the Cleveland market, and I make this statement without any exception whatever. This company's franchises are perpetual. It has a contract with the people it does business with for 99 years. It has no switchboards to wear out, and it has as fine a long-distance plant as there is in the country. The public simply don't realize what they are getting when they buy these bonds, and the time will come in the near future, say in two or three years, when these bonds will sell above par."

AN OPPORTUNITY FOR YOU

It is probable that our readers have noticed the little articles, each descriptive of some telephone idea, which we have been printing. We like these because we think they interest everyone. In view of this, we solicit from all telephone men some little article along a similar line. Every telephone man must have at least one such idea. They may pertain to any branch of telephony, line work, instrument setting, switchboards, wiring, circuits or exchange bookkeeping—no matter what department they deal with so long as you know that they are good and that they will work.

If you have never written, don't let that discourage you. We are not after literary works; what we want are ideas. Write them as well as you can and if they are not all right we will round off the corners here. If you think that it will help to make it clear send a sketch to accompany your description. Often a glance at a sketch will give more information than a page of reading. Don't think your idea is too simple to be of value. Often the simple ones are the best. we will pay for everything accepted at our regular rates.

Write on one side of the paper only and make the sketch on a separate sheet. Be sure and have your name and address both on the manuscript and on the drawing. Don't write your letter on the same sheet of paper with your article or the drawing—use a separate sheet. Address, The Editorial Department, The American Telephone Journal, 116 Nassau St., New York City.

THE PROSPEROUS LOS ANGELES COMPANY.

Stock of the Home Telephone Company, of Los Angeles, Cal., touched $50 a share recently on the Los Angeles Stock Exchange, a mark which establishes an entirely new record for a security that prior to four months ago had no standing among local investors. Except to a few persons who had acquired the stock in the days when the company was being organized, The Home Telephone Company was practically unknown up to June 1. For the purpose of preventing control of the property passing into hostile hands, a holding corporation has been organized, whose object is to retain at least 51 per cent. of the stock. The promoters of the new corporation have considerable more than half of the Home Telephone Company's capital. Just how much is held by the pool is immaterial, but the amount is stated to be enough so that the transfer of the company to rivals or anybody else in the near future will be impossible.

Incorporators call their new holding company the Home Trust Company, and the object is in keeping with that designation. It is intended to keep the stock of the Home Telephone Company in trust by those who made it possible for Los Angeles to enjoy the advantages of a competitive telephone system. Officers of the holding company include W. S. Bartlett, president; J. E. Fish burn, vice-president; and John Van Liew, secretary. Other members of the directorate are J. S. Torrance, H. W. Hellman, W. C. Patterson, J. M. C. Marble, Thomas W. Phillips, A. B. Cass, Frank F. Graves, of this city, and A. K. Detwiler and George G. Metzger, of Toledo, Ohio. The company has more than 8,000 telephones connected, and the number is increasing as rapidly as the instruments can be placed in service.

STATEMENT OF INTERSTATE'S BUSINESS.

SENATOR EVANS, president of the Interstate Telephone Company, of Illinois, recently gave a statement regarding the property. "We now have a property investment of about $1,300,000," said he, "and as soon as we get into Chicago we shall increase that investment very largely. We hope to have our entire toll system connected with a Chicago exchange before long, and when that is done the entire middle west will be covered by our service. We are now operating in Springfield and have some 900 telephones. We have the underground work installed there and will soon begin making connection."

The balance sheet of the company for the year ending June 30, 1903 is:

RECEIPTS.		
June 30, 1902, balance (surplus earnings)		$14,314.31
Rental earnings		115,265.48
Toll earnings		13,139.41
		$142,719.20
DISBURSEMENTS.		
Operating expense	$40,060.17	
Maintenace	13,003.40	
Dividends paid	26,627.00	
Bond interest	30,605.06	
Taxes and insurance	5,852.67	$116,148.30
Balance—Good accounts	$13,250.00	
Balance—Cash on hand	13,320.90	26,570.90
		$142,719.20

Total switchboard capacity, 18,065 telephones. Total switchboard equipped complete, 11,499 telephones. Total feet of subway trench, 107,378. Total feet of ducts, 588,706. Total number of manholes complete, 367. Total feet of cable installed complete, 768,617. Total number of telephones installed complete, 9,242. Total poles set and equipped complete, 1,449 miles. Total open wire to connect telephones, 9,462 miles. Total toll line poles set and equipped complete, 697½ miles. Total toll line open wire connecting exchanges, 2,015 miles. Average per cent. of increase for year, 102.

A MODEL MUTUAL SYSTEM.

IN Jessup, Iowa, has been installed a Mutual Telephone system which is said to be a model of its kind. The Farmers' Mutual Telephone Company, of Jessup, was organized a year ago last spring and now has 180 instruments installed. Its lines extend to Brandon, on the south, where connections with other lines are made, and to Independence on the east. A line runs to the north of Littleton, five miles, and another extends six miles beyond Dunkerton, where it connects with the Cedar Valley System.

The poles used are of white cedar, and while not tall are well proportioned. The exchange has recently been completed. Metallic circuits are used exclusively. This practice is not very common in small country exchanges. While the plant was being installed there was but one question asked about any matter that might come up. It was: "What is the best?" The consequence is, that it has not been necessary to spend five dollars for repairs since the system was first installed. Dr. E. W. Headon, the president, has done much toward the success of the company. The other officers are: John F. Burrell, vice-president; A. D. Mount, secretary, and John Robinson, treasurer. Chas. Frush, Jas. Tracey, Dan Pack, Otto Hammelman and Parson Smith are the directors. The company has 120 miles of wire in operation.

ROCKY MOUNTAIN REFUSED FRANCHISE IN IDAHO.

AT the regular semi-monthly meeting of the village trustees of Sand Point, Idaho, the question came up of the application of the Rocky Mountain Bell Company for a franchise. The company was represented by A. J. Miller, of Butte, who made some remarks in favor of the applications of his company. It appears that efforts were made some months ago by the citizens of Sandpoint to induce the Rocky Mountain Bell Company to establish an exchange in that place, but without avail.

Shortly afterward the Interstate Telephone Company presented application for a franchise, which, after considerable discussion by the board, was granted. Immediately upon the granting of the franchise the latter company began operations and will have an exchange established in a short time. Wires are now being strung all over the city and an exchange has been fitted up.

The Bell Company, it is said, did not desire to put in a local exchange, but merely wanted the right to pass through the town and put in toll lines.

EMERGENCY TELEPHONE CALLS ENGINE.

A PRACTICAL demonstration of the telegraphone was made recently on the B. R. & P. R. R., which runs from Rochester, N. Y. Through an accident to the locomotive a train of eleven cars of excursionists was brought to a dead stop near Ellicottsville. In the old days of railroading it would have been necessary to send a man to the nearest station for another locomotive, but at this up-to-date period no such proceeding is necessary. It happened that in an official's private car, which was at the rear end of the tran, there was an emergency telephone set so when the breakdown happened a porter was sent out to the line which paralleled the railroad, and by means of a pole on the end of which a V-shaped connector was fixed, he arranged a telephone circuit, so that the orders for a new engine could be given to the next station telephonically. The new engine arrived promptly and soon took the train on its way.

INJURED BY FALLING POLE.

SAMUEL DUFRESNE, of Worcester, Mass., has brought suit in the Rhode Island Supreme Court for $30,000 against the Providence Telephone Company, alleging that on March 22, 1902, he was employed to string wire on the company's poles; that he was sitting on the cross-arm of a pole at work and the pole fell to the ground. He claims that he was permanently disabled and received internal injuries. The negligence he alleges on the part of the company is that the pole was set in the ground from 18 to 24 inches, which was too shallow a hole to contain a pole if it was expected that the pole would stand firm.

PRIVATE SYSTEM FOR R. C. & I. CO.

A COMPLETE private telephone system has been completed by the Reading Coal & Iron Co., which connects all its offices throughout the coal region. An exchange has been established at the company's main office in Pottsville, Pa. Formerly communication was maintained between the main office and the collieries by telegraph, and although this service will be continued, the demands on it will not be so great.

The Editor's Page

THE BELL PRESS AGENTS ARE BUSY: THE KELLOG COMPANY A NEW TOOL.

IN our issue of last week we pointed out how the Bell interests have begun to capitalize systematically, their purchase of the Kellogg Switchboard and Supply Company, by exploiting the sale in a manner peculiarly their own, through the public press. One phase of this exploitation we described at some length, giving extracts from an inspired article in the *Financial News,* of Boston, in which it was grossly set forth that the parent Bell Company was now, thanks to this purchase of the Kellogg stock, in a position to collect royalties from every Independent company in America. This statement, industriously circulated by the Bell agents in the old familiar manner through the public prints, seemed mendacious enough.

Evidently, however, it is only the beginning, for we notice the reproduction during the current week, of an article that goes even further in the effort to make press capital out of the shameful Kellogg business. This article was started on its rounds by the Boston *Statist.* Not content with merely saying that the Bell people, through their control of the Kellogg business, are now in a position to exact tribute from every Independent company in the land, this delightful organ announces cheerfully that the whole telephone industry is, thanks to the Kellogg sale, once more to be safely stowed away in the inside pocket of the American Bell—not such a bad effort at real artistic lying in view of the fact that the Independent instruments now in operation in America outnumber the Bell by at least three-quarters of a million. In its general tone this article follows exactly the lines of the one quoted last week, but extending beyond that it goes on as follows:

> The Kellogg Switchboard and Supply Company supplies all of the switchboards and apparatus used by the Independent Companies, and with the control of the Kellogg Company in the hands of the American Telephone and Telegraph Company, their source of supply would be shut off.

Only one hope of escape is left the Independent companies, according to this conservative organ, and that is so remote that the paper only touches on it by inference. This remote hope lies in the possibility of a decision in favor of the plaintiffs in the suit instituted by the minority stockholders to set aside the sale of the majority stock. With an adverse decision, the article makes it clear, there will be nothing left for the Independents except jail or the junk heap.

Ordinarily THE AMERICAN TELEPHONE JOURNAL would treat such a palpable set of lies with the levity they merit on their face and set them forth as fair examples of the absurd and bootless things put out by the Bell in its efforts to delude the people. Unfortunately there is enough real menace in the Kellogg affair, unless it is properly understood, to let these efforts to use it for false campaigning go with light notice. The Independents had a hard time of it to achieve the high standing they now hold. It was rough, up-hill work to enlist even local capital in the building of Independent systems. It required years of missionary work and years of experimenting, to convince capital that there is money in the Independent business. Thanks to the indomitable pluck of the pioneers, the situation was finally made clear and the industry put on a sound basis where not alone the local capitalist, but the general investor, is eager to put money in any well managed Independent enterprise. It was the recognition of this final "arrival" of the Independent business that inspired the Bell people to buy the Kellogg stock. Millions had been spent in the operating field in the attempt to kill off competition, with no tangible result except to bring bankruptcy to three of the principal Bell licensee companies, the Michigan, the Central Union and the Erie. In desperation then the Bell officials at Boston turned in another direction. By that fatuous reasoning that has always distinguished them, and that has cost their stockholders so dearly, they made it out, that if they could get hold of the manufacturing end of the Independent industry they might accomplish the thing they had sought in vain through paying fancy prices to the opposition in the operating end. And their usual fate befell them.

Groping around blindly, willing to take anything in sight along the new line of attack, they grasped eagerly at the Kellogg stock—stock that no one who knew anything about the business would have had at any ordinary price. It was the one big manufacturing company in the field that was in a bad way—that was in fact practically bankrupt as its own officers have confessed in the pleadings entered in the annullment suit. Left to itself, these officers have since sworn, the company must have foundered under the weight of its gross mismanagement. There was hardly a salesman in the Independent field who did not know this.

The cunning gentlemen of the Boston mole hills were probably the only telephone men who were blind to the real state of affairs. Like the opera bouffe villians of the stage they alone saw nothing. They moved about masked and booted with drawn stilletos, and plunged headlong into the scene, and drove their stilletos home to the hilt in the man of straw that had been artfully set before their blood hungry eyes. It was a pretty sight to the onlookers and needed only slow music and dim, red lights to complete the picture.

It rests entirely now with the Independent operators whether these stage villians of Boston shall be left high and dry with their dummy, or whether they are really to make something out of the transaction. If they and their purchase are left severely alone, if the Kellogg Company is recognized, as it is, a mere Bell annex, the transaction will result, as have all similar transactions in the past, and the underground workers will have paid their money for nothing, as they have invariably paid it before, where they have attempted to undermine opposition by backdoor methods.

It is only if the Independent operators allow themselves to be deluded into having anything to do with the concern in its new guise that any harm can be done. We believe that the Independents are too level-headed for that, that they will have no trafficking with a Bell agent, no matter in what disguise he may come. The experience of the past is a safe warrant for this assumption. As for the press exploitation, that, too, may be scotched, if every man interested in the Independent movement makes it his business to offset, by his own work, the efforts of the Bell agents who are engaged in spreading the false statements that we have quoted.

FOREIGN CURRENTS

By "The Arrester."

THE chief telephone topics at present occupying the foreign technical press are the recent Telephone Inquiry at Hull, and the discussion of the second year's accounts of the Glasgow municipal telephone system. Both of these come in for some caustic comments on the part of the electrical and engineering papers. The *Electrical Review,* in a leading editorial, pays its compliments both to Hull and to Glasgow. It says: "The proceedings at Hull show very clearly the haphazard manner in which Town Councils are willing to rush into the telephone business under conditions which, so far as we are aware, are not supported by any other authorities on telephone exchange working. It appears that the original report was prepared early in 1900, and was in no way amended this summer, when it was decided to proceed with the scheme, although three years are known to produce important changes in telephone practice, and although the local telephonic conditions had greatly changed in the interval. Further than this, it is clear from the evidence at the inquiry, that, apart from practical imperfections in the proposed system, neither the reports nor the estimates paid adequate attention to the important question of spare plant." The *Review* says that it is general experience that nearly 40 per cent. of the plant of a large and growing telephone system is always idle and that this has an obvious effect on the average capital cost per subscriber, which has never been recognized by the advocates of municipal telephony.

Switchboards Mere Details

ONE curious feaure of the Hull Inquiry the *Review* draws attention to, which goes to show how difficult it must be to get serious consideration of telephone questions in England: "We note with surprise," says the article, "that at the Hull proceedings the switchboard was considered a mere mechanical detail, not worth discussing. It appears that a switchboard on the old-fashioned magneto 'ring-through' system was originally recommended, but at the inquiry this specification was thrown overboard, and it was stated that a different system was to be adopted, which the Corporation witness refused to describe. The inspector subsequently ruled out the questions relative to the switchboard, on the ground that it was an unimportant detail, not affecting the actual object of the inquiry." Yet the inspector was supposed to be an engineer, qualified to deal with engineering subjects. The *Review* goes on in a burst of righteous technical indignation as follows: "Since the style of switchboard not only dictates the whole arrangement of the exchange, the construction of the subscribers' instruments, and to a certain extent the design of the subscribers' lines, but also directly governs the kind of service that is to be given, it is astonishing that any man qualified to preside at a telephone inquiry should deem it to be a detail of no importance.

Wallowing, Splashing, Shouting, Glasgow

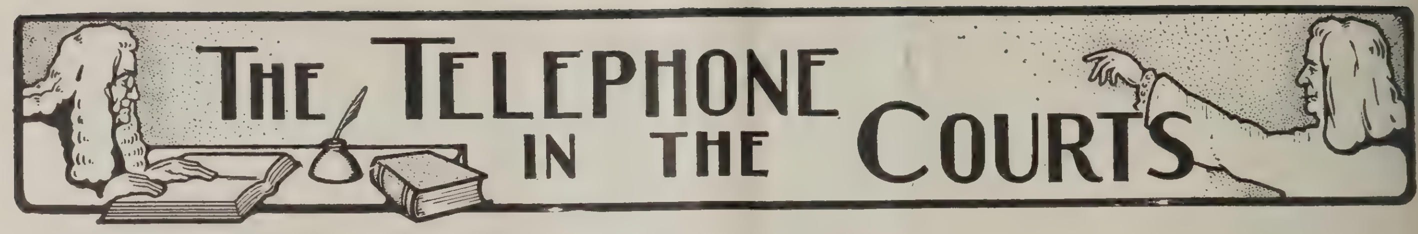
THE *Review* critic thinks that Hull, warned by the disclosures made at the inquiry, will not proceed with its municipal telephone scheme, and then passes to the Glasgow situation, which is picturesquely and pointedly described as follows: "Glasgow is wallowing deep in the mire of an unsound and uncommercial telephone enterprise, and is making the most prodigious splashing and shouting in order to conceal from the uninitiated the real state of affairs. Glasgow, like the other municipalities that have taken up the business of telephony, was led into it on the basis of estimates purporting to show that the average capital cost of telephoning a town ranges from $90 to $100 per subscriber's *line.* The Glasgow accounts recently published show a total capital expenditure of $1,350,000 for 9,122 *instruments,* an average of over $147 per instrument. One does not need to have built the first telephone line in London to know that in a modern telephone system all the instruments do not represent lines. Many subscribers' lines have two instruments on them, some have ten or a dozen. Yet in the discussion at Glasgow these 9,000 instruments are freely flourished as 'subscribers.' If the Glasgow Corporation telephone statistics were more completely stated, the accounts would bear a very different interpretation from that put on them in the Glasgow Town Council."

The Weak Spots

THE *Review* has certainly put its finger on a weak spot here, and it will be interesting to see whether more "complete statistics" will be forthcoming, so that the true facts may be arrived at. Some further comments are made on the operating expenses, which are brought out on an unduly low figure at Glasgow; it is pointed out that there has been no charge made at all for depreciation and that expenditures which ought to be charged to expense are being charged to capital. These points are clearly brought out in the special report of the official auditors. A long editorial article in *Engineering* is also devoted to a scathing criticism of the Glasgow telephone accounts, and of the action of the Council in adopting the accounts, notwithstanding the analysis made of them by several Councillors, who insisted that the surplus of $10,000 was purely imaginary and would be converted into a loss of much larger amount if the accounts were correctly stated. The opinions of *Engineering* on the subject are practically contained in this paragraph: "One councillor who supported the Committee was simple enough to give away the whole case in one sentence. He agreed that a larger sum would have to be provided, but they were not going to provide it by throttling the concern. That truthful remark let the cat out of the bag. If proper payments were made to depreciation and sinking fund the telephone rates would have to be increased. An increase of these rates would mean the loss of present clients and the withdrawal of many applications now before the department. There would, therefore, be a serious check to progress—nay, there might even be a 'throttling' of the concern. Depreciation must, therefore, wait till circumstances permit of its being openly recognized, if that day should ever come. This is an old dodge, practised a few years ago in Glasgow by the Electricity Committee and now handed on to this new department."

ROCKFORD AND DURAND, ILL., CONNECTED.

ROCKFORD, Ill., telephone subscribers are now able to talk with those at Durand over the lines of the Winnebago County Telephone Company. The new Durand exchange has been connected with the exchange of the Central Union company in Rockford and there will be free communication with the towns in the western part of the county. The Winnebago County Company now has fifty miles of line. The lines in operation include one to Centerville, one to Roscoe, one covering part of the distance to Cherry Valley, and one going south from the city paralleling the Bryon line of the Home Company. Exchanges will be installed in the near future in Roscoe and Rockton. The company has arranged for the purchase of the Central Union lines outside the city with the exception of the toll lines. This will give it practically all of the lines in Winnebago and Pecatonica. It is probable that subscribers in the last named towns will be turned over to the county company by October first.



THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

LIABILITY FOR EVEN NECESSARY INJURY.

"IN erecting our wires and poles we were compelled to trim trees that belonged to property owners along our line. We did this very carefully and did no cutting that was not absolutely necessary. We have a franchise granted by the city council to build our line and the council's permission to occupy the streets we did. We could not possibly do it without trimming the trees. Some of the property owners now ask us to pay them damages. Must we do so? J. A. B."

THERE is no doubt of your liability in the case even though you did no unnecessary damage. In the case of Bronson v. Albion Telephone Company (Neb.), 60 L. R. A. 426, the court held that a telephone company which removes, destroys or injures trees planted by an abutting property holder along the line of his property, under the terms of a city ordinance in erecting poles and wires under its franchise, is liable for the resulting damage, although no unnecessary damage is inflicted. This means that, although the telephone company does only what it is obliged to do for its own accommodation and convenience, it must pay if it thereby damages anybody's property.

RESPONSIBLE ALTHOUGH NOT NEGLIGENT.

A DECISION of considerable interest has been given by the Supreme Court of Massachusetts, in the case of Jeremiah Riley v. the New England Telephone & Telegraph Company, holding that such companies are liable for personal injuries to persons traveling on highways, where the injury is due to the existence of their poles in the street, provided the injured party is in the exercise of due care. The liability of corporations in such cases is held under the statute to be the same as that imposed by the legislature upon the owner or keeper of a dog which has bitten a person, the fact that the owner or keeper is free from fault not changing his liability. The only escape which corporations are held to have is, as in the dog law, that the injured person's carelessness brought about the injury.

Riley, the plaintiff in the case, was injured on Bridge Street, Cambridge. One of the wheels of the wagon he was driving passed into a depression in the street, causing the wagon to lurch against one of the defendant company's telegraph poles on the sidewalk close to the curbstone and leaning out toward the street. The pole had been erected and maintained under a license from the municipal authorities, which required the company to maintain it in as nearly perpendicular a position as practicable. A jury returned a verdict for the defendant in the Superior Court. This is now set aside and a new trial granted.

The Court, in an opinion by Chief Justice Knowlton, says: "The statute creates a liability without any reference to negligence. The legislature seems to have recognized that the erection of the poles and fixtures in public ways would create obstructions that might interfere to some extent with the use of the public streets and increase the liability of travelers to accidents. Such obstructions, whether placed in a sidewalk or in a part of the street designed for use by vehicles, being there when the streets are lighted and when they are in darkness and in every variety of possible conditions, subject persons in the exercise of due care to risks which do not otherwise exist."

Judge Lathrop, in a dissenting opinion, said that he did not see why the Court should read into the statute that the injured person must be in the exercise of due care without also reading into it that the company should also be guilty of negligence with respect to its fixtures before it was liable, and adds: "It will be curious to see how far the majority of the court will carry its interpretation of the statute. It frequently happens at the present time that an automobile gets beyond the control of the person in charge, and plunges into a telegraph pole outside of the traveled way, and the automobile or the person in charge is injured. Is the owner of the pole to be held liable? I cannot think that the Legislature intended any such consequence to result from the language used in the statute." Jeremiah Riley v. New England Telephone & Telegraph Co., 68 N. E. 17.

CITY MAY ONLY DIRECT.

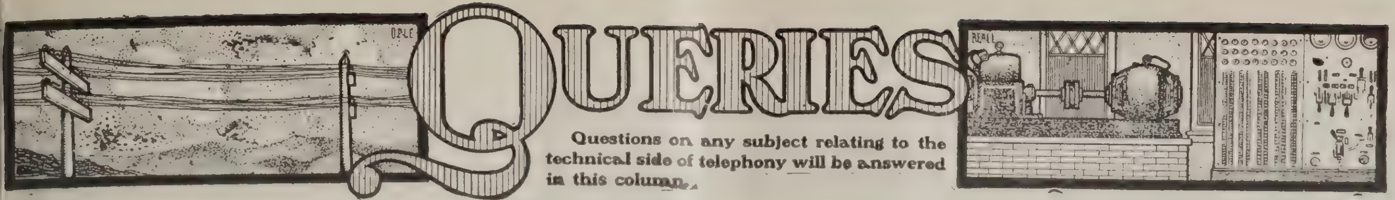
BY a decision of the Court of Appeals, delivered recently at Osgoode Hall, the city of Toronto fails in its contention that the Bell Telephone Company has no rights in the streets without the city's consent. The Court held that the work of the company fell under the British North America Act and that Parliament had jurisdiction under that act to give, and actually had given, the company power to erect its poles and wires. By a provision of the second Dominion of Ontario Acts, the consent of the city council was necessary to the location of a line, but the council could not refuse its consent entirely. A line must be erected somewhere, and in the locating both parties must act reasonably, but the statutes required action and not merely refusal to act. The required consent was a power to regulate and not to prohibit.

MOTION FOR INJUNCTION OVERRULED.

JUDGE BRADBURN, of the Circuit Court, at Bowling Green, Ky., has overruled a motion for an injunction by the East Tennessee Telephone Company against the Southern Electrical Construction Company. The relief sought was the restraining of defendant from interfering with it by placing its telephone poles in too close proximity to its poles and wires on different roads in the country. The effect of the decision is to allow the construction company to continue to use the same side of the roads on which the East Tennessee Company now has its poles and wires, until a final hearing can be had at the November term of the court.

MORE LITIGATION FOR MICHIGAN TELEPHONE CO.

A CASE against the Union Trust Company, as receiver for the Michigan Telephone Company, has arisen at Sault Ste. Marie, Mich., that is similar to the Mahan case at Detroit. Thomas M. Rogers was a subscriber of an Independent company, whose business was acquired by the Michigan Telephone Company. After abandoning the property, the Michigan company refused to give Rogers service, and Judge Steere denied a mandamus compelling the company to do so. The Supreme Court has granted an order directing Judge Steere to show cause why the mandamus should not be granted.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

A PECULIAR TROUBLE FROM LIGHTNING—(204.)

Our line gang was stringing some wire on a pole line equipped with open wire and an aerial lead covered cable. One of the new wires got loose and fell across the working open wires and a trolley wire. It was about 2 minutes before the foreman lifted the wire and removed the cross. This happened about ¼ of a mile from the exchange. At the exchange office pole the open wires and aerial cable pass through a cable box to a lead covered underground cable that runs down the pole, and through an iron pipe to the exchange. Fuse protectors are placed in the box, and in the exchange the protection consists of carbon open space arresters, and heat coils. Upon examination at the exchange, it was found that the heat coils were blown on three lines, which took open wires past the point where the cross occurred. The current had arced across the open space arresters. The cable sheath was examined from the point where the cross occurred to the cable box, as was also the sheath of the underground cable from the box to the beginning of the iron pipe. No trace of burn could be found. When the arresters were replaced the three lines tested O. K.

That night a thunder shower came up, the lead underground cable was burned out, and the exchange disabled. How could the trolley cross so affect the line that the lightning charge would burn out the cable, and yet enable us to get an O. K. test directly after the cross had been cleared? At the same time, if the line was not affected by the cross, why did not the protection in the cable box save the underground cable when the lightning struck the line? E. C. S.

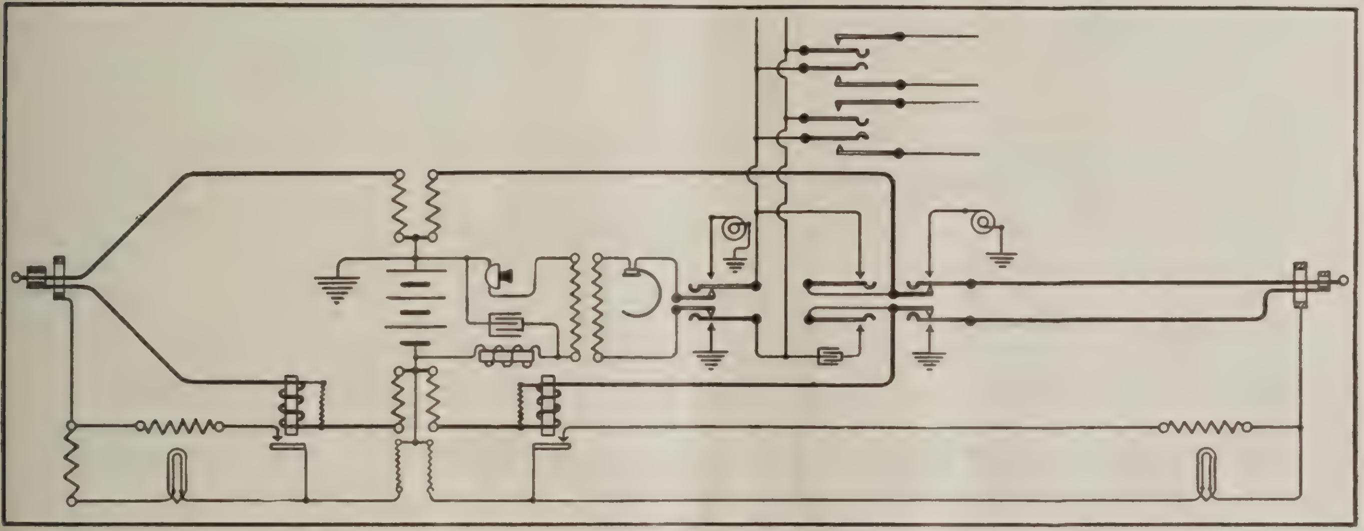


Fig. 205.

Cases often arise in which the protecting apparatus seemingly fails to work, the causes for which are often hard to determine In your case, when the cross occurred the trolley current might have punctured the insulation of the conductors in the underground cable, before the heat coils "blew" in the exchange. Directly the heat coils "blew" a dead ground was formed and the current was carried to ground by this path and not through the puncture, that is to say, the puncture, and the blowing of the heat coils occurred almost simultaneously, the former taking place an instant before the latter. It is entirely possible for this puncture to have been so made that no actual ground would result and the lines would therefore test O. K. in dry weather. In the evening, when the shower began, if the underground cable at the point where it entered the iron pipe, was not properly "corked," the water would run along the cable sheath, and coming to the puncture, would form a ground, so that when the lightning flash occurred a path of practically no resistance was formed to carry off the charge, the cable fusing at the point where the ground existed. Accidents of this kind, while rare, are very hard to guard against. In your case, there seems to be nothing that you could have done to prevent the burn-out. If the cable department had been summoned directly after the cross occurred, they might, if equipped with a very sensitive galvanometer, have detected the puncture. But even so, there would not have been sufficient time to replace the length of cable. What should have been done, however, was to properly "cork" the cable at the point where it entered the iron pipe, and if you have similar construction at other points in your territory, you should inspect them thoroughly with this end in view.

DIAGRAM OF CORD CIRCUIT.—(205.)

Will you oblige me with a drawing of a Bell cord circuit? P. H. W.

Such a circuit is indicated in Fig. 205. Cord circuits vary somewhat, but the one shown gives the principles common to all of them.

ANTI SIDE-TONE OPERATORS' CIRCUIT.—(206.)

In some of the operators' circuits in the exchange where I am working they are putting in what they call an anti-side-tone device. Can you tell me how it works? D. N. H.

The anti side tone device for the operator's telephone circuit that you speak of, simply consists of the insertion of non inductive resistance in the battery circuit which supplies the transmitters, so as to reduce the sensitiveness of the transmitter.

VOLTAGES ON COMMON BATTERY SYSTEM.—(207.)

Please state how many circuits there are which require separate voltages and from what source this energy is derived in a Bell common battery system? W. M. P.

We cannot answer your question without knowing the details of your system, as the systems in use vary. Those of early design used several voltages, one using 2, 4, 8 and 20 volts, which were obtained by tapping the storage battery at the requisite points. The modern systems employ one 24 volt battery, to the terminals of which all circuits are connected. If a voltage under 24 is desirable, resistance is interposed to reduce the battery voltage to one available.

REGARDING THE FULLER CELL.

W. M. Lannan of Mt. Savage, Md., writes relative to Query No. 197—"Trouble With Fuller Cell," that he has found that the same trouble, viz., the breaking of the copper wire to the zinc element, is frequently caused by the copper wire not being thoroughly amalgamated when the cell is set up. He has found this to be the case where there was no possibility of a partial short circuit.

PATENTS ISSUED

SWITCHBOARD FOR INTERCOMMUNICATION SET.

Geo. F. Archer, of New York City, patents (No. 739,636) a switchboard particularly applicable to intercommunicating telephone systems. This invention is shown in elevation in Fig. 1, and in section of Fig. 2, and the circuits in Fig 6. Briefly described, there is a hook switch provided with a number of contacts as shown in Fig. 1. This is connected to a sliding rod *3a* which is adopted to make a various combination of contacts with the fingers *9* to *13* inclusive, arranged beneath the hook switch. In Fig 6, the various circuits are shown in combination with the hook switch contacts of the sliding contacts on the rod. Those who are interested in a device of this kind will be able to trace the operation of the invention.

Fig. 1.

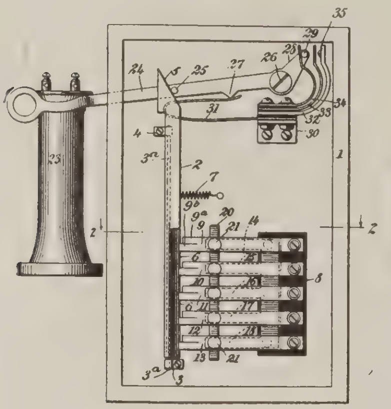


Fig 2,

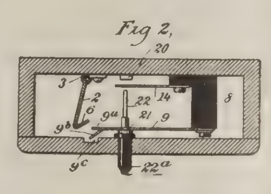
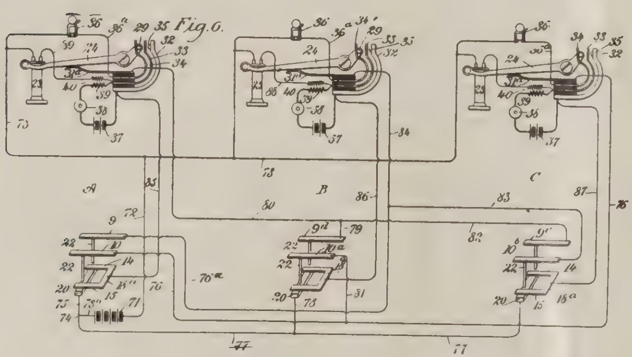


Fig. 6.



TELEPHONE CIRCUIT PROTECTOR.

Gustavus E. Hoaglund, of Chicago, Ill., patents (No. 738,803) and assigns to the Stromberg-Carlson Telephone Mfg. Co., an improved circuit breaker. The object of this invention is to provide an improved heat coil which shall be reliable in operation and free from the defects to which heat coils have previously been liable. This invention is shown in Figs. 3, 4, and 5. Upon an insulating base the two springs *c. c.*, are mounted. One of these springs holds one end of the heat coil *d*, while the releasing portion of the coil is held in the other spring. A section of the heat coil is shown in Fig. 4. The fine wire *h*, that forms the portion of the circuit which is heated by an abnormal current is wound about the plug *f*, and then secured in the hole *i*, by means of a small wedge. The object of this is to secure electrical contact, and at the same time provide a method whereby the wire may be readily released when the heat coil operates. When the device is operated upon the presence of abnormal current in the coil *h*, the stem *f* is broken, permitting the wire *g* and the plug *i* to separate, thereby opening the circuit.

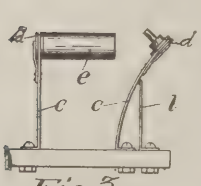


Fig. 3.

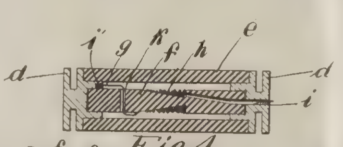


Fig. 4.

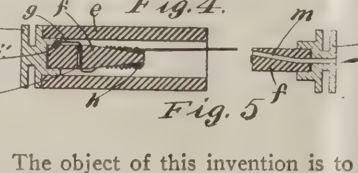
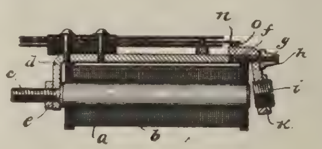


Fig. 5

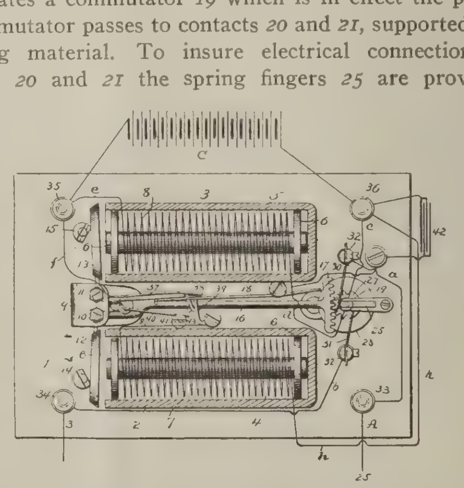
IMPROVED ELECTRIC MAGNETIC SIGNAL.

C. M. Hedman, of Chicago, Ill., patents (No. 738,801) and assigns to the Stromberg-Carlson Telephone Mfg. Co. an improved annunciator or drop. The object of this invention is to provide an annunciator in which the reluctance of the magnetic circuit may be adjusted at pleasure. The invention is shown in the figure, in which *a* is the core and *b* the winding of an electro magnet. In front of this an armature *f* is pivoted. In the center of this armature there is an iron plug *I* inserted by means of a screw thread. It is therefore possible by screwing or unscrewing this plug to increase or decrease the air-gap, and thus vary the reluctance of the magnetic circuit.



RINGING CURRENT APPARATUS.

Noah S. Harter, of Cherokee, Ia., patents (No. 738,437) a device for supplying ringing currents to telephone exchanges. The object of this invention is to provide an apparatus for changing an electric current from a battery or other generator into a pulsating current or alternating current for the purpose of ringing subscribers' bells. This apparatus is shown in the figure. In the illustration *1* represents an apropriate base board. Upon this there are two electro magnets *4* and *5*. These magnets carry armatures *12* and *13*, which are attached to a vibrating arm *16*. This rack bar operates a commutator *19* which is in effect the pole charger, this commutator passes to contacts *20* and *21*, supported by suitable insulating material. To insure electrical connection with the members *20* and *21* the spring fingers *25* are provided. The magnet 4 is included in a bridge circuit from one pole of battery *C* to binding post *35*, wire *f*, contact finger *38*, pin *39*, wire *g*, coil



magnet *4*, wire *h*, binding post *36* to the other bell and battery. When the magnet *4* is energized the commutator is actuated and the current from the battery reversed. The line circuit closes the path of the current as follows: Battery *C*, binding post *36*, wire *c*, commutator *20*, brush *30* to conductor *a*, binding post *33*, line *A*, line *B*, binding post *34*, wire *b*, brush *31*, commutator member *21* wire *d*, magnet *5*, wire *e*, binding post *35* over terminal and battery *C*. When the magnet *5* is energized the arm *16* will be moved and by the rack the relation of the commutator brushes is shifted. Then the circuit is from the battery to binding post *36*, commutator member *20*, brush *31*, post *34*, line *B*, line *A*, binding post *33*, brush *30*, through coil at magnet *5*, binding post *35* to battery. This will open the bridge circuit, and cause the magnet *4* to release its armature. Then the current will take the first path over again.

IMPROVED LIGHTNING ARRESTER.

John Davis, of Sterling, Ill., patents (No. 938,988) an improved lightning arrester, the object of this to provide a device which shall be self-cleaning, and shall not be inoperative owing to an accumulation of dust and dirt. This device is shown in elevation in Fig. 1 and in section in Fig. 2. In the figures *1* is a non-conducting base, carrying two posts, *2* and *3*. Supported on these posts is a cross piece *6*, the upper part of which carries a fuse wire. On the under side of the cross piece is a triangular strip of carbon *8*, supported in the holders *9*. Between the carbon block *8* and the other carbon block *10* are two thin strips of non-conducting materials such as mica, that adjust the separation of the two pieces of carbon. As both carbon blocks are provided with V-shaped grooves as shown in the section there is no probability of the accumulation of dust and dirt.

Fig. 1.

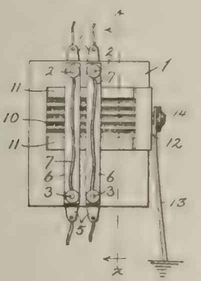
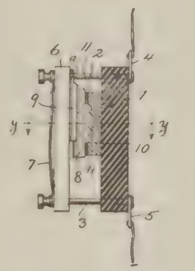
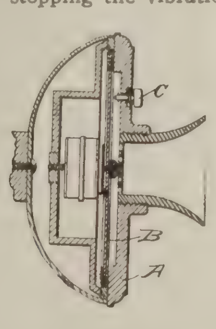


Fig. 2.



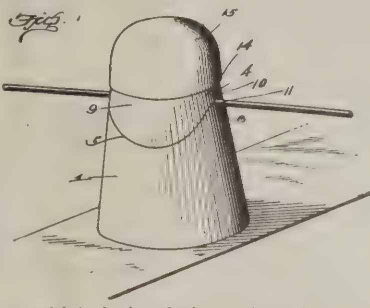
TELEPHONE TRANSMITTER.

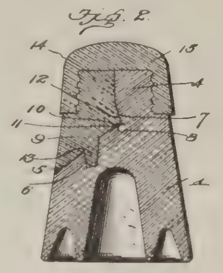
Harold D. Stroud, of Chicago, Ill., patents (No. 738,857) an improved telephone transmitter. The object of this invention is to provide a means of stopping the vibrations of the transmitter diaphragm at will. It is shown in the figure, which is a section. There is the usual base plate *A* and diaphragm *B*. Through this diaphragm a button *C* is placed that is controlled by a spring. The speaker into the transmitter can at will touch the button, which upon being pressed, presses against the diaphragm and stops the vibrations.



IMPROVED INSULATOR.

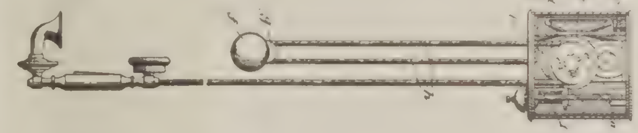
Herman Bottjer, of Atlanta, Ga., patents (No. 739,147) an improved insulator for telephone or telegraph lines. This device is illustrated in Fig. 1, and has for its object the provision of an insulator so arranged as to secure the wire without the use of any tie wire. There is a base portion *1* that is secured on the ordinary cross-arm pin in the usual manner. The top of this portion of the insulator is formed as is shown in section in Fig. 2, from which it is obvious that there are two pieces, which combined, form a kind of a cap. The upper portion *15* being secured by means of a screw thread upon the lower part *1*, while the piece *9* fits around the wire, locking it and being locked in place by means of the cap *15*.





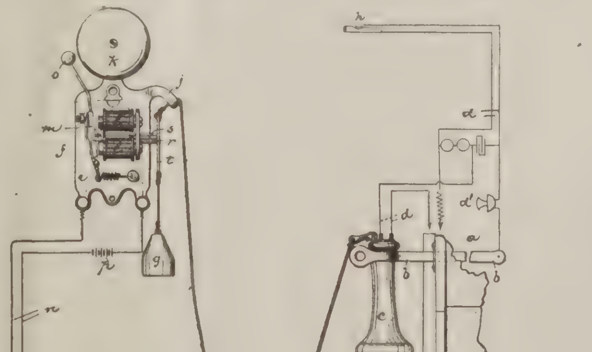
TELEPHONE APPLIANCE.

Milton I. Vought, of La Crosse, Wis., patents (No. 738,861) an improvement in telephone apparatus. The object of this invention is to provide a new means of actuating the armature of the magneto generator. It is shown in the figure, in which a combined transmitter and receiver is suspended by means of a cable *h*. This cable passes over a wheel *c'*, which is arranged on the magneto generator. Consequently when the telephone is pulled down the magneto is operated, and thus the act of bringing the telephone into a proper position for speaking sounds the calling signal.



TELEPHONE ALARM.

John D. Peachey, of East Orange, N. J., patents (No. 738,351) a device for causing a telephone to sound a fire alarm. This is illustrated in the figure. There is an alarm bell *K*, which is connected to any form of thermostatic circuit. In case of a fire the thermostat in the bell circuit operates. This causes the bell to sound the alarm. The operation of the electro magnet in the bell releases a catch *s* and allows the weight to fall. This weight is connected with the receiver on a sub-station set. The falling of the weight removes the telephone from the hook-switch, and sounds a call to the central office. The transmitter *d'* is so placed that the ringing of the bell can be heard by the central office operator.



The Week's Messages.

FINANCIAL

CHICAGO, ILL.—The Norstron Lockout Telephone and Manufacturing Company, of Chicago, has increased its capital stock from $8,000 to $10,000.

FOREST CITY, ILL.—The Forest City Telephone Company has increased its capital stock from $5,000 to $20,000.

STEWARDSON, ILL.—The Stewardson Telephone Company has increased its capital stock from $2,500 to $5,000.

BOSTON, MASS.—The Mexican Telephone Company reports as follows for July and the five months ended July 31:

July:	1903.	1902.	Increase.
Gross	$22,824	$20,121	$2,703
Operating expenses	11,479	11,778	*299
Net	11,345	8,343	3,002
Five months ended July 31:			
Gross	113,049	98,668	14,381
Operating expenses	57,983	52,750	5,233
Net	55,066	45,918	9,148
Subscribers	4,700	4,213	487
Gain since March 1, 222.			

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*Decrease.

MONROE, NEB.—The Monroe Independent Telephone Company has increased its capital stock from $5,000 to $10,000. The officers of the company are: William Webster, E. R. Dack, W. M. Pollard, B. S. Thurston and A. D. Fellers.

FREMONT, O.—The Fremont Home Telephone Company has increased its capital stock from $60,000 to $100,000.

PHILADELPHIA, PA.—The following table shows the Bell Telephone Company of Philadelphia increases in gross earnings for a period of years:

	Inc. over preceding year.
1900	250,000
1901	430,000
1902	460,000
1903 (4 months est.)	738,000

It is estimated that the net earnings this year will be between 28 and 29 per cent. of the gross earnings.

NASHVILLE, TENN.—The report of the Cumberland Telephone and Telegraph Company is as follows: August gross, $281,013; expenses, $182,926; August net, $98,087; other income, $10,223; total net, $108,310; total subscribers, 93,378, a gain of 281 for the month.

FRANCHISES

GENESEE, IDAHO.—Messrs. Forney and Moore, attorneys, of Moscow, Idaho, appeared before the city council recently and applied for a franchise for a new telephone line to be constructed through the farmers' districts.

BICKNELL, IND.—The Bicknell Independent Telephone Company, which operates exchanges here and in Bruceville, has recently applied for a franchise to do business in Edwardsport, which was granted. The officers of the company are: Joseph Barr, of Bruceville, president; W. D. Teman, vice-president; Frank McClure, treasurer; James G. Hoover, secretary, and Ernest D. Miller, manager.

SIOUX CITY, IA.—The special election at which the citizens of this place voted on the question of granting a franchise to the new Independent telephone company, which is represented by George C. Scott, a local attorney for J. A. Thompson and others, proved to be a landslide in favor of the new company, as the people voted overwhelmingly in favor of granting it a franchise.

ROCKLAND, MASS.—The Old Colony Automatic Telephone Company has been granted franchises in Rockland, Abington and Whitman.

MANCHESTER, N. H.—The Citizens' Telephone Company intends to extend its line to Meredith, in which town a franchise has been secured for the construction of an exchange system. It has also been decided to establish a central office at Tilton.

NEWTON, H. H.—The Exeter Telephone Company, of Exeter, N. H., has asked for a franchise in this town. G. Shaw, of Exeter, represented the company before the selectmen and the matter was taken under advisement.

TRENTON, N. J.—The Interstate Telephone Company has been granted a franchise to run its lines in Pleasantville.

GOSHEN, N. Y.—The Highland Telephone Company, of Newburg, has been granted a franchise to do business in this town.

JAMAICA, N. Y.—The New York & Long Island (Independent) Telephone Company, which has offices in Freeport and Hempstead, has bought the franchises which the old Knickerbocker Telephone Company held for New York, Brooklyn, and Queens Borough. The company has consolidated with the South Shore Telephone Company, which has several exchanges on Long Island, and it is announced general offices will be established in this city.

NUNDA, N. Y.—The Rural Telephone Company, of Dalton, has been granted a franchise to extend its line into this town and it is expected that the company will construct a local exchange.

HAMILTON, O.—The county commissioners have granted a franchise to construct a telephone system to the Willey Elevator Company.

MARION JUNCTION, S. D.—The council has granted a telephone franchise to Dr. A. E. Hofer, who says he will at once install a local exchange.

CHATTANOOGA, TENN.—The ordinance granting a franchise to the Hamilton Telephone & Power Company has passed the board of councilmen and will, it is asserted, pass the aldermen at the next meeting.

PERSONAL

ROBERT BURNS, manager of the B. & B. Telephone Company, of Hutchinson, Kan., is spending a week in Oklahoma Territory on a hunting trip.

H. F. ETTINGER, manager of the Delaware & Atlantic Telegraph and Telephone Company, has been transferred from the Chester, N. J., District to Camden, N. J.

J. T. FEATHERSTONE, who has been construction foreman for the Cumberland Telephone and Telegraph Company for several years, has been promoted to the position of district superintendent, and will have charge of all the construction work of the company in Kentucky. His headquarters will be in Louisville, O. A. Mitchell, of Nashville, Tenn., will succeed him as district foreman.

O. E. GRANBERY, formerly switchboardman of the Southern Bell Telephone Company, at Montgomery, Ala., has been promoted to chief inspector of the exchange. George F. Moore, Jr., is filling the position made vacant by the promotion of Mr. Granbery.

D. O. NEWBERY has returned to Norfolk, Va. He has been away to promote the organization of a telephone company in Currituck county, N. C.

MALCOLM C. RORTY, traffic engineer in the main office of the American Telephone Company, at Boston, has recently been elected vice-president of the Telephone Society of New England, an organization for the study of telephone improvement and the advancement of the interests of the telephone business. The society has a large membership and is of much importance in the telephone world.

H. G. STILES has resigned his position with the Utica, N. Y., Home Telephone Company, to accept one with the Citizens' Telephone Company of Waterville, N. Y.

H. C. STOUFFER, who has been identified with the Delaware and Atlantic Telephone Company for several years in the various branches, has been appointed manager of the office in Chester, Pa., to succeed H. F. Ettinger, who has been transferred to Camden, N. J.

FRANK J. STRASSNER, assistant wire chief for the Stark Telephone

THE WEEK'S MESSAGES—Continued

Company, at Canton, Ohio, has gone to Lafayette, Ind., to take a course in electrical engineering, specializing on the telephone, in Purdue university.

E. A. WOODRUFF, for the past three years chief inspector to the Raleigh, N. C., Southern Bell Telephone Exchange, has gone to Charlotte, where he will assume the chief inspectorship. He is a brother of F. L. Woodruff, assistant traffic manager in the general offices at Atlanta, Ga.

ELECTIONS

NORTHVILLE, MICH.—At a recent meeting of the Northville Telephone Company the following directors were elected: Dr. J. M. Burgess, president; F. S. Neal, vice-president; R. H. Porter, secretary; E. H. Lapham, treasurer; M. A. Porter, manager; A. K. Carpenter, Dr. J. M. Johnson, W. H. Yerkes and W. G. Yerkes. The company declared a ten per cent. annual dividend.

ORION, MICH.—The Orion Telephone Company has elected the following directors: Ira Carpenter, H. E. Goette, A. G. Haddrill, P. T. Butler, George Tunison, J. C. Predman and Fred Weiland.

CLAYTON, MO.—The stockholders of the recently organized St. Louis County Telephone Company have elected the following officers: B. C. Lucas, president; F. A. Heidom, vice-president; D. C. Taylor, secretary; Ernest Marshall, treasurer, and James D. Houseman, general manager.

COMBINATIONS.

DURANT, I. T.—The Chickasaw-Choctaw Telephone Company has purchased the line of the Western Telephone Company, which operates a line from Durant to Mead, and will later extend the line to Kinloch, Fort Washita and Madill.

GREAT BEND, KAN.—The Rock Telephone Company has purchased the telephone exchange at Great Bend of the Grimes Light, 'Phone & Power Company.

NICKERSON, KAN.—M. E. Richardson has sold the telephone exchange at Nickerson to local parties.

CLARKSBURG, W. VA.—The Consolidated Telephone Company is making arrangements to purchase the Kingwood Telephone Line, which would give the Consolidated Telephone Company connection to all towns as far as Cumberland.

UNDERGROUND

SACRAMENTO, CAL.—M. J. Dillman, manager of the Capital Telephone Company, in an interview denying that his company has sold out to the Sunset Telephone & Telegraph Company, said that arrangements were being made by his company to put its wires underground. At present it uses a grounded return system.

FLINT, MICH.—The Valley Telephone Company has been granted permission to construct certain underground conduits.

CRANFORD, N. J.—At the regular meeting of the township committee the Central New Jersey Telephone Company presented a petition for a franchise to lay conduits for underground wires throughout the township.

OSWEGO, N. Y.—The Empire State Telephone and Telegraph (Bell) Company is obtaining consent of property owners for an underground conduit franchise.

WILMINGTON, N. C.—The Inter-State Telephone Company is obtaining estimates for the construction of an underground conduit system.

RATES

BATTLE CREEK, MICH.—At a recent meeting of the directors of the Citizens' Telephone Company, of Battle Creek, it was decided to advance the rates to the maximum limit allowed under the company's present franchise. The present rate is $20 for a residence and $30 for business telephones. The new rate, which will take effect January 1, will be $24 for residence and $36 for business telephones.

MISCELLANEOUS

BOSTON, MASS.—The American Telephone & Telegraph Company's statement of the output of instruments for August and the fiscal year to date with comparisons follow:

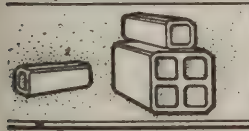
			Increase.
Gross output	63,565	84,279	*20,714
Returned	46,136	43,034	3,102
Net output	17,429	41,245	*23,816
From Jan. 1 to Aug. 30:			
Gross output	732,823	733,323	*500
Returned	325,393	303,355	22,038
Net output	407,430	429,968	*22,538
Outstanding August 31................	3,557,750	2,955,574	602,176

*Decrease.

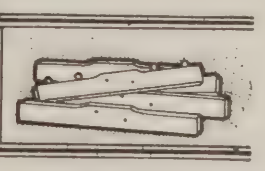
UTICA, N. Y.—The new directory of the Utica Home Telephone Company contains the names of 2,140 subscribers. The new company has just completed two toll lines to Trenton Falls, one of which is a public line and the other for the use of the Utica Gas & Electric Company.

ALBEMARLE, VA.—The Albemarle Mutual Telephone Company has been granted permission to change its corporate name to the Farmers' Mutual Telephone Company. The officers of the company are: T. E. Powell, president, and Charles A. Miller, secretary.

SPARTA, WIS.—The Wisconsin Bell Telephone Company, which proposes to re-enter the field in this city, and has promised a lower rate than is given by the Monroe county company, has been prohibited by the city council from erecting any more poles or stringing wires in the city limits.



New Construction in the Field



ST. JOHN, N. B., CANADA.—The project to establish an Independent telephone system in St. John is meeting with general favor. The promoters report that enough subscribers have been promised to make the service a success and that the matter will be formally placed before the city council at the October meeting.

DOVER, DEL.—The Diamond State Telephone Company, headed by Harry A. Richardson, of Dover, has just completed a line to Taylor's Island, Maryland, which gives a connection to Church Creek, Woolford, Madison and Taylor's Island. The company is rebuilding the lines from Salisbury to White Haven, and will connect up the towns of Nanticoke, Bivalve, Tyaskin and several others in that section of country ,with Tyaskin as the central office.

BALDWIN, ILL.—The Farmers' Mutual Telephone line may be extended from here to Stringtown, Evansville and Preston.

ORRVILLE, IND.—The Independent Telephone Company, of Mt. Carmel, Ill., has extended their lines to this place. The telephone office here is in charge of George Ingle, who has been with the Bell Company.

EVANSVILLE, IND.—At a meeting of the B. M. A., of Evansville, the Municipal Telephone Company's future was discussed. Although it is yet to be decided by law as to whether or not the Cumberland Company has a right to operate in Evansville, the Municipal Company has placed orders for telephones and other supplies with different companies. There will be about five miles of underground conduits on the principal streets. The exchange will be equipped to serve 2,500 patrons.

PRINCETON, IND.—The Evansville & Princeton Traction line will install a complete telephone system.

VINCENNES, IND.—The Home Telephone Company is preparing to extend its lines from Decker to Redcloud, where it will have about fifty subscribers.

MUSKOGEE, IND. TER.—A. Z. English, manager of the Muskogee National Telephone Company, says the business of the company has increased to such an extent that the present equipment is inadequate.

Reinbeck, I. A.—L. H. Bowhan and H. L. Green, secretary and general manager, respectively, of the United States Telephone and Telegraph Company, which recently purchased the line of the Cedar Valley Telephone Company, here here recently and stated that the local system will be thoroughly overhauled and repaired. T. K. Elliott is president of the new company and James Derdiner is vice-president.

SIOUX CITY, IA.—Confident there will be no delay in passing the franchise ordinance by the city council, the promoters of the Sioux City Telephone Company are preparing plans and estimates to go ahead with the construction of their system.

MINNEAPOLIS, MINN.—The Twin City Telephone Company will construct a long distance line to Blue Earth, Minn., where it will be met with a line which the Kossuth Telephone Company will construct from that point to Kossuth, Minn.

LOGAN, MO.The Logan Telephone Company will extend its line from Leonora to Hill City.

TRADE NOTES

The Stromberg-Carlson Telephone Manufacturing Co., Rochester and Chicago, recently closed a contract with the Benson Telephone Co., Benson, Minn., and the Red River Valley Telephone Co., of North Dakota, for one of their 400 line capacity generator call visual signal switchboards.

The Ewing Merkle Electric Company, of St. Louis, Mo., is a new and very promising addition to electrical supply field. The company has been in business but four months, but on account of its wonderful success is the talk of the electrical field. Its progress has been without precedent.

The Empire Electric Supply Company, of 57 West Jackson Boulevard, Chicago, has been incorporated under the laws of Illinois. C. L. Hibbard is the secretary and general manager. Mr. Hibbard is well known to the electrical trade, having been for past five years western agent for the Varley Duplex Magnet Co., of Providence, R. I., with headquarters at Chicago. This new company will deal in and manufacture all kinds of electrical machinery, telephones and supplies, ringer coils, magneto bells, transmitters, receivers, etc.

The North Electric Company, of 149 St. Clair Street, Cleveland, Ohio, recently celebrated a field day and picnic at Silver Lake, which is thirty-five miles south of Cleveland. There was a regular old-time "field sports" program arranged, which was carried out to the letter. Hansome and useful prizes were provided, to be given to the winners of the many events. One of the features of the day was a baseball game between the "Polar Bears" and the "North Stars," two nines composed of men in the company's employ. The Polar Bears won, the score being 7 to 2. A trophy in the shape of a silver cup was presented to the winning team. The trophy is a permanent challenge and will be played for by all of the teams in the institution during the year. A train of ten coaches was required to take the party to and from Silver Lake. All that attended are unanimous in declaring that they had an excellent time.

The Kellogg Switchboard & Supply Company, through its Eastern District office, located in the Keystone Telephone Bldg., Philadelphia, Mr. Paul W. Bossart, Manager, reports recent sales as follows: Dallas, Pa., 200 line switchboard and telephones; Tunkhannock, Pa., 100 line switchboard and telephones; New Albany, Pa., 25 line switchboard and telephones; Waterside, Pa., 25 line switchboard and telephones; Alexandria, Va., 350 line switchboard and telephones; Frenchtown, N. J., 150 line switchboard and telephones; Perth Amboy, N. J., 200 line switchboard and telephones; Lambertville, N. J., 150 line switchboard and telephones; Flemington, N. J., 150 line switchboard and telephones; New Egypt, N. J., 100 line switchboard and telephones; New Lisbon, N. J., 100 line switchboard and telephones. In addition to the foregoing list of sales, the Company has just secured orders for substantial additions to the "Main" and "Race" Exchanges of the Keystone Telephone Co., in Philadelphia, amounting to five sections for each exchange, making the total present equipment of each of the above exchanges 5,200 lines.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

TELEPHONE SYSTEM.—Telephone system in Central Indiana for sale. Good investment for right party. It includes fifty year franchise, toll and farmer lines. Write for particulars. Address, KEMPTON TELEPHONE COMPANY, Kempton, Ind.

TELEPHONE SYSTEM. Telephone system in Northwest Arkansas, 200 miles in operation, 325 subscribers, 200 miles extension needed immediately. No Competition. Excellent connections can be had with Indian Territory, Joplin, Springfield and other Missouri points, also Little Rock, Arkansas. This line is key to the situation. Pays 15 per cent. annually, best prospects to pay 25 per cent. inside of a year. Boom in progress. Three new railroads building, also electric line and two other roads under survey. Lack of transportation has heretofore retarded the growth of the country. Good reasons for selling. Address, HERMAN H. VER MEHREN, 633 Paxton Block, Omaha, Neb.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

THE LIBRARY OF CONGRESS desires to secure Volumes 1, 2, 3 and 4 of The American Telephone Journal for its file. Parties who may have these volumes, or parts of them, which they would like to dispose of, please communicate with the LIBRARIAN OF CONGRESS, Washington, D. C.

TOLL TICKETS FOR SALE.—You use them every day. 5,000, printed on three colors, excellent design, prepaid, $2.50. Cash with order. The American Telephone Journal knows we are O. K. Ask for samples. GILDART BROS., Albion, Mich.

POSITION.—Competent telephone man desires position as Superintendent or Wire Chief. Has had 13 years' experience with Bell and Independent companies. Best of references furnished; 32 years of age; married; temperate; industrious. Address F. H. CURTIS, 196 Bleeker Street, Gloversville, N. Y.

ARE YOU AMBITIOUS? Would you like to make more money than you do at present? We can tell you an easy way to do so. Write at once for full particulars. Address Box 93, care of The American Telephone Journal, 116 Nassau Street, New York City.

TO LEASE EXCHANGE.—Wanted to lease, Telephone Exchange by experienced man. Will correspond with parties having exchange with or without toll lines, with view of buying. West or Southwest preferred. Address, Box 92, The American Telephone Journal, 116 Nassau Street, New York City.

TELEPHONE ENGINEER.—The First German Telephone Manufactory wants for the management of its construction departments for multiplying an experienced Telephone Engineer. Men, well experienced, especially with the Modern Common Battery System and who have been active for some time in large plants of this specialty, are requested to send detailed applications to I. U., 5764, care of RUDOLF MOSSE, Berlin, S. W., GERMANY. Knowledge of the German languagy necessary. 91.

TELEPHONE PLANT. Wanted a telephone plant with from 100 to 500 subscribers in the west, preferably California. State all conditions and terms for payment. Address, Box 89, The American Telephone Journal, 116 Nassau St., New York City.

ACCOUNTANT.—Wanted, first-class acountant and bookkeeper to take charge of a large Independent Telephone Company's office and books in Pennsylvania. Address, Box 88, The American Telephone Journal, 116 Nassau St., New York City.

POSITION.—Thoroughly experienced telephone manager now successfully operating 500 line common battery plant, desires position with progressive Independent company. Best references from present and former employers. Address, Box 82, The American Telephone Journal, 116 Nassau Street, New York City.

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau street, New York City.

The American Telephone Journal

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VOLUME VIII SATURDAY, OCTOBER 10, 1903 NUMBER 15

LAYING THE CABLE TO BLOCK ISLAND

By George B. Hewes.

TELEPHONIC communication will be renewed between Block Island, off the coast of Rhode Island, and the mainland, by the recent installation of a new cable, which will also carry a telegraph circuit. The task of laying the cable, which was no small one, required the services of a tug, a big lighter, and quite a crew of men. The cable was brought from Jersey City, N. J., to the place where it was to be laid on a lighter towed by a tug. The outfit left Jersey City Thursday afternoon at 5 o'clock, and arrived at New London, Conn., Friday morning at 11 o'clock. Saturday morning at 6 o'clock the lighter carrying the cable was taken in tow by the tug and the start was made for Matunuck Beach. It was a hazy morning, and before the tow had worked entirely out into Fisher's Island Sound a heavy fog closed down and navigation became difficult. The tug was once obliged to stop to feel for bearings; progress was made slowly and cautiously as far as Watch Island. Then the fog lifted a little and the coast line was closely followed to Matunuck Beach, where the tug arrived at 11:30.

The Pile of Cable on the Deck of the Lighter.

The work of handling the end of the cable was a troublesome matter, and great caution was necessary to escape running aground in the shallow water. At the same time, it was necessary to get as far in shore as possible, as it would not have been practicable to handle the heavy cable if the outfit was any great distance from shore. In this the workers were quite fortunate, as the sea was smooth, and with care it was possible to work the lighter well in toward the surf before landing. While pulling the lighter around, a two inch hawser was parted by the strain, and then the tug pulled out a little farther as the soundings showed a depth of water that left a small margin over her draft. The heavy anchor was then dropped out from the lighter, and by paying out carefully on the anchor warp the cable bearing craft was brought within three or four hundred feet of the beach. The tug remained at a safe distance farther out.

The work then to be done was to land the heavy end of the cable. This was accomplished by sending a medium sized hawser ashore in a small boat. Some trouble was experienced in doing this, as the first section of hawser sent ashore was too short to reach the beach, therefore it was necessary to splice another length. The point where the cable lands at Matunuck Beach is some five or six hundred yards west of the hotel, and a pole line leads down to the spot. The last pole is at the edge of a sand dune just above the beach, and to this pole the block and tackle were attached. Then the cable end was made fast to the line and the signal was given to haul away.

There were plenty of willing hands, for beside part of the crew of the lighter most of the men on the tug had gone ashore, and there were a number of men from the Matunuck Summer Colony who were on the beach watching the operation and many of them assisted in pulling the cable ashore. With so many hauling on the line the end of the cable was quickly landed upon the beach. Enough slack was pulled ashore to reach the pole, where connection to the land line was to be made. An iron cable box was attached to the pole, and the end of the cable was brought up and wound around the pole, the ends of the wires being carried into the box and arranged for connection with the land wires. This done, the cable layers returned to the tug and the lighter and prepared to start on the run to Block Island. Two hours were spent in landing and securing the cable at Matunuck. A good deal of this time was consumed in getting the lighter nearer to shore, and in going to and from shore. There was little trouble in landing, as the breakers were not rolling heavily, but, nevertheless, all who made the trip had wet feet when they again reached the tug.

Lighter Carrying the Cable In Shore Preparatory to Landing It.

The tug again got under way, with the lighter, at 1:40 P. M. The one hundred tons of cable were piled up in large coils on the deck of the lighter. The coils slowly unwound and paid out over the stern as the craft moved to the southward. The members of the lighter's crew stood about on the big pile with watchful eyes, to see that the cable did not kink as it was steadily paid out over the stern. Planks had been placed through the pile at intervals when the cable was placed on the lighter, to keep the coils as straight as possible, and to prevent tangling, which might have been caused by the settling of the great mass. The crew were kept busy in taking out these planks, and freeing a length of cable about to rise from an adjacent convolution that occasionally threatened a twist. The cable was carried up from the pile through two big blocks on the derrick boom, and then passed down through a run on which a brake attachment had been arranged. This was on the stern of the boat, and the cable was paid out into the water, sinking a few feet beneath its surface astern. It ran out easily. The weight of the cable already paid out was all that was necessary to keep the cable on the lighter uncoiling from the big heap on its deck as the vessel moved slowly ahead.

The first mile of cable was paid out in 25 minutes; the second in half an hour; and the third in 25 minutes. After that the progress was somewhat faster, and the 10 miles to Block Island were covered in a little under four hours. On leaving Matunuck the tug was lashed to the side of the lighter, and continued this way for about four miles. The wind, however, steadily increased in force until there was a stiff southwesterly breeze that blew up an ugly chop sea, in which the lighter and tug labored heavily. Finally, one of the connecting hawsers parted under the great strain, and to make running easier the tug went ahead, taking the lighter in tow with two long hawsers. The tug and lighter arrived at Sandy Point, the northernmost tip of Block Island, where the landing was to be made, about 5:30. The sea had gone down considerably, and a thunder storm with sharp lightning commenced, and the afternoon's work was finished in a heavy rain. The day had been one of varying moods, starting with dense fog and a calm, developing a high wind and heavy sea, while there was a mild touch of sunshine for a time, concluding with rain, thunder and lightning.

The landing at Sandy Point was made in much the same manner as at Matunuck, the tug drawing in shore as far as was safe. The remainder of the cable was hauled ashore and the work was postponed for the night. The tug and lighter put in at New Harbor at 8:30 P. M. The next morning all were astir at a seasonable hour, and at Sandy Point, where the tug and lighter had preceded, the cable was pulled up and cut off and the connections made. It was close calculating on the length of the cable, as there were only about three hundred feet excess, and that is a small amount in a length of ten miles. A slight deviation in the course taken by the cable-laying outfit on the previous day might easily have left the lighter some distance out at sea, with the crew maintaining a desperate clutch on the end of the cable, with no prospect of getting it ashore. This would have involved endless labor and trouble, and those in charge of the work were inclined to be grateful when they saw how close the estimate had been and thought of the result had the three hundred feet chanced to be shortage instead of surplus. The distance from shore to shore is 10 miles, and there was only three hundred feet surplus out of the 11 miles of cable. This discrepancy was partially accounted for by the uneven bed of the sea which the cable rests upon. Further, Block Island was obscured by haze when the trip from Matunuck began Saturday, and although the course was laid in a direct line with the compass, the unwieldy lighter and the tug were carried somewhat to the westward by the strong current. Had a fog prevailed throughout the afternoon, it is quite possible that the 11 miles of cable would have come to an end before the landing was made at Block Island.

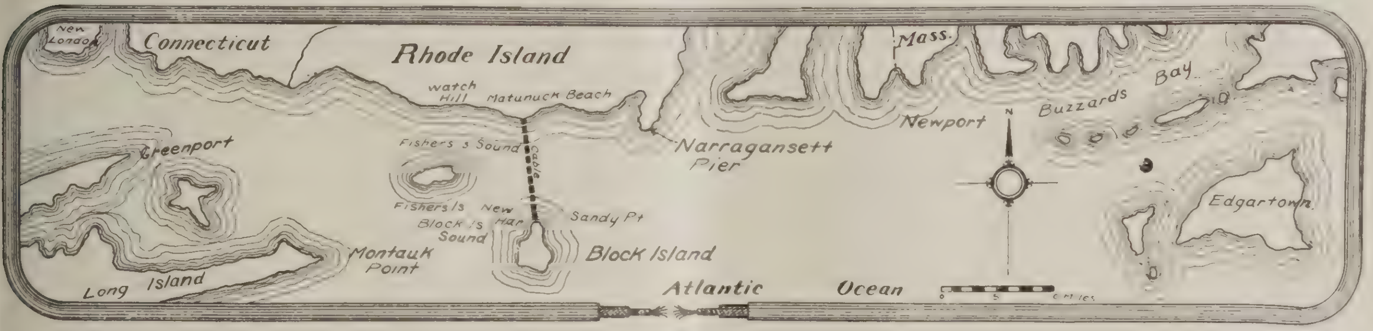
Carrying the End of the Cable Up the Beach to Connect With the Land Line.

The 300 feet of surplus cable were cut off and coiled up and buried in the sand, where it may be reached in case of future needs. The three land wires were already strung as far as the beach, and after putting up the cable box the connections were made, and the cable was tested and found to be in working order. So far as the Island is concerned, the cable was ready for use, and all that remains is the completing of connections on the mainland. The cable will be buried on each end from the cable box to a point beyond the low tide line. The action of the tide helps in this, and already the cable is reasonably well buried in the sand of the beach.

The cable is the property of the United States Weather Bureau and cost about $20,000,00. It will be used jointly by the telegraphic service of the Weather Bureau, the Western Union Telegraph Company, and the Providence Telephone Company, the latter using two of the three wires by a special arrangement by the Government. There is at present a single wire cable in use by the Western Union Telegraph Company and the Weather Bureau, but it is very old and likely to become useless at any time. Another three wire cable extending from the village of New Shoreham, at old harbor, to a point near Narragansett Pier, was laid and put in use during the Spanish - American war, but it became useless in about two years, and could not be repaired. When taken up, it was found of its 15 miles of length only about 6 miles were good for use.

Making a Test of the Cable Where It Joins the Land Line at Block Island.

The cable that was laid Saturday was manufactured by the Okonite Company, of New York and Passaic, N. J., a concern that makes a specialty of ocean cables. There were three conductors in the cable, each composed of seven strands of No. 22 copper wire twisted together and insulated with Okonite compound. The three covered wires are bound with jute over which is a layer of Manson tape and another layer of jute. This is wound with 12 No. 3 galvanized iron wires, coated with tar, and then another layer of jute covered with tar, on which is a coating of powdered soapstone, which facilitates handling. The diameter of the cable is one and three-quarters inches, and the total weight of the 11 miles is something over 200,000 pounds. The making of the cable occupied six weeks, and it took two days to load it on the three special freight cars which conveyed it from Passaic to Jersey City, where it was loaded on the lighter for`transportation to the place where it was to be installed. The accompanying map shows the location of the different points referred to in the description.



TELEPHONE EXCHANGE ENGINEERING

ARTICLE XII.—TESTS WITH WIRE CHIEF'S DESK APPARATUS

By Ray H. Manson, Albion D. T. Libby and Charles A. Simpson.

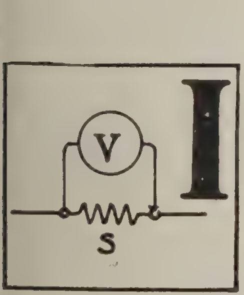


Fig. 21. Galvanometer Shunt.

IN a previous issue (No. 6, Vol. VIII.) the circuits of a wire chief's desk were taken up. In this article the method of using them will be described and illustrated with numerical examples. Referring now to the testing cord circuit, Fig. 18, it will be seen that the keys on this circuit are used as follows:

(1.) A ringing key to enable the wire chief to ring any subscriber whose line is under test.

(2.) A reversing key which reverses the position of the testing apparatus with respect to the tip and ring of the line.

(3 and 4.) Grounding keys. One for tip side of line, the other for ring side.

(5.) A voltmeter key which bridges the voltmeter across the cord circuit.

(6.) A relay key used in testing for grounds.

(7.) A mechanical ringing key which, when set, rings automatically.

(8.) A spare, which can be used by the wire chief for any purpose.

(9.) A listening key which connects the wire chief's telephone set across the cord circuit.

(10.) A retardation coil key to be used in a similar manner as the retardation coil key, Fig. 15.

(11.) A battery key which connects a battery to the cord circuit through a repeating coil or retardation coils for conversational purposes.

(12.) A battery cut off which cuts off battery from the voltmeter.

(13.) A battery switching key which connects a 12-volt battery to the low scale of the voltmeter.

(14.) A shunt key for the volt meter (low scale).

METHOD OF MAKING TESTS FOR LINE TROUBLE.

At the multiple board, plug *P* of Fig. 17, is inserted in the multiple jack of the line to be tested, and plug *P*, Fig. 18, is inserted in jack *J*, Fig. 17.

TEST FOR GROUNDS.

Fig. 18 shows two methods of testing for grounds. First by throwing key *6*, will give a test for grounds on the ring side of the line; then by throwing the reversing key *2*, will give a test for ground on the tip side of the line. This testing relay being the same as the No. 1 relay used as a line relay, Fig. 1, (see No. 15 AMERICAN TELEPHONE JOURNAL) gives the comparative strength of the ground, i. e., if the ground for example, on the ring side of the line, is such as to have caused a permanent ground on the local board, then relay *R* will pull up and operate buzzer *B*.

In order to exactly measure the resistance of the ground the voltmeter must be used. Take a reading direct from the 120-volt dry battery or a testing dynamotor, giving 120 volts direct current, for testing purposes, by throwing the grounding key *4*, so as to ground the ring side of the line, then throw the voltmeter, key *5*. It will be seen that this will give the full voltage of the battery or a deflection which we will call *d*. Now open key *8*, and if there is ground on the ring side of the line, the voltmeter will show a deflection of d′. Knowing the resistance of the voltmeter, the resistance of the ground is given by the formula $R = r\frac{(d-d')}{d'}$. Next throw the reversing key *2*, and get the deflection d′ on the tip side of the line, the resistance being calculated as above.

The above method is not very accurate when the ground is of very low resistance, as will be readily seen when compared with the following method, which should be used for measuring low resistance grounds. Suppose, when testing by the first method, the reading d′ is between 119 and 120, the tenths being estimated, say, .9, which is as close as it is possible to read a 0-150 and 0-15 scale voltmeter, the division on the high scale being 1 volt. Applying the formula $R = r\,\frac{(d-d')}{d'}$ we have $R = 20{,}000 \times \frac{(120-119.9)}{119.9} = 16.6$ where r equals 20,000 ohms, the resistance of the coil of the high scale of the voltmeter, 16.6 ohms then is as low as it is possible to measure by this method and there is considerable chance for error since it requires close observation to distinguish between a reading of .8 and .9.

The second method involves the use of the low scale of the voltmeter which, in this case, the coil is one-tenth the resistance of the high scale, i. e, 2,000 ohms, a shunt around the voltmeter controlled by the key *14*, a 12-volt battery controlled by key *13*. It will be noticed that the shunt around the low scale of the voltmeter is 222 ohms. This is obtained from the parenthetical part of the formula below $Ct = Cv\,\frac{(Rv + Rs)}{Rs}$ Where Ct = total current in circuit, Cv = current in voltmeter, Rv = resistance of voltmeter, Rs = resistance of shunt. The part in the parenthesis is the factor by which the current in the voltmeter must be multiplied to equal the total current and therefore called the multiplying power of the shunt.

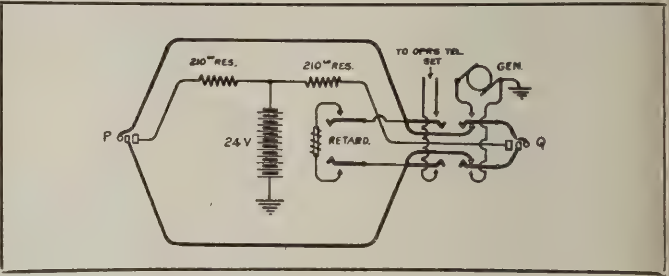


Fig. 15. Wire Chief's Connecting Cord Circuit.

The formula is derived from the circuit arrangement shown in Fig. 21.

$Ct = Cv + Cs$ (1).

E = Any E. M. F. which produces a current flow Ct; then $\frac{E}{Rv} = Cv$ (2), and also $\frac{E}{Rs} = Cs$ (3); then

$E = Cv\,Rv$ (4), and $E = Cs\,Rs$ (5); therefore,

$Cs\,Rs = Cv\,Rv$ (6), and

$$Cs = \frac{Cv\,Rv}{Rs} \quad (7)$$

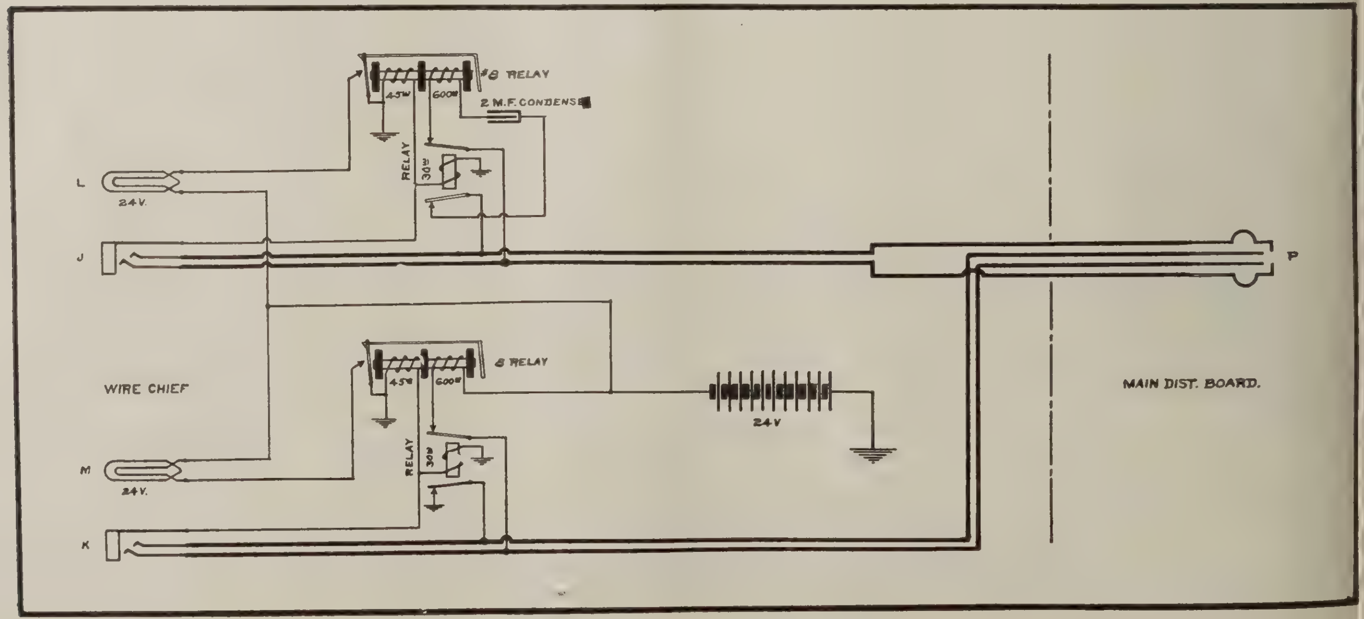
substituting in (1) we have

$$Ct = Cv + \frac{Cv\,Rv}{Rs} \ (8) = \frac{Cv\,Rs + Cv\,Rv}{Rs} \ (9) = Cv\,\frac{(Rv + Rs)}{Rs}$$

If we desire a multiplying power of 10 which will be seen to be large enough, we can place the expression: $\frac{Rv + Rs}{Rs} = 10$. Then substituting the voltmeter resistance Rv = 2,000 ohms, we have $\frac{2{,}000 + Rs}{Rs} = 10$ or $9\,Rs = 2{,}000$, $Rs = 222 +$ ohms.

Now to see the application of this method with plug *P*, Fig. 18, in the testing trunk circuit jack, Fig. 17, the plug of which is already inserted in the multiple jack at the local board, throw key *14*, then *13* for the 12-volt battery and No. *5*. Suppose the reading is 11.9,

Fig. 16. Wire Chief's Testing Trunks to Main Distributing Board.



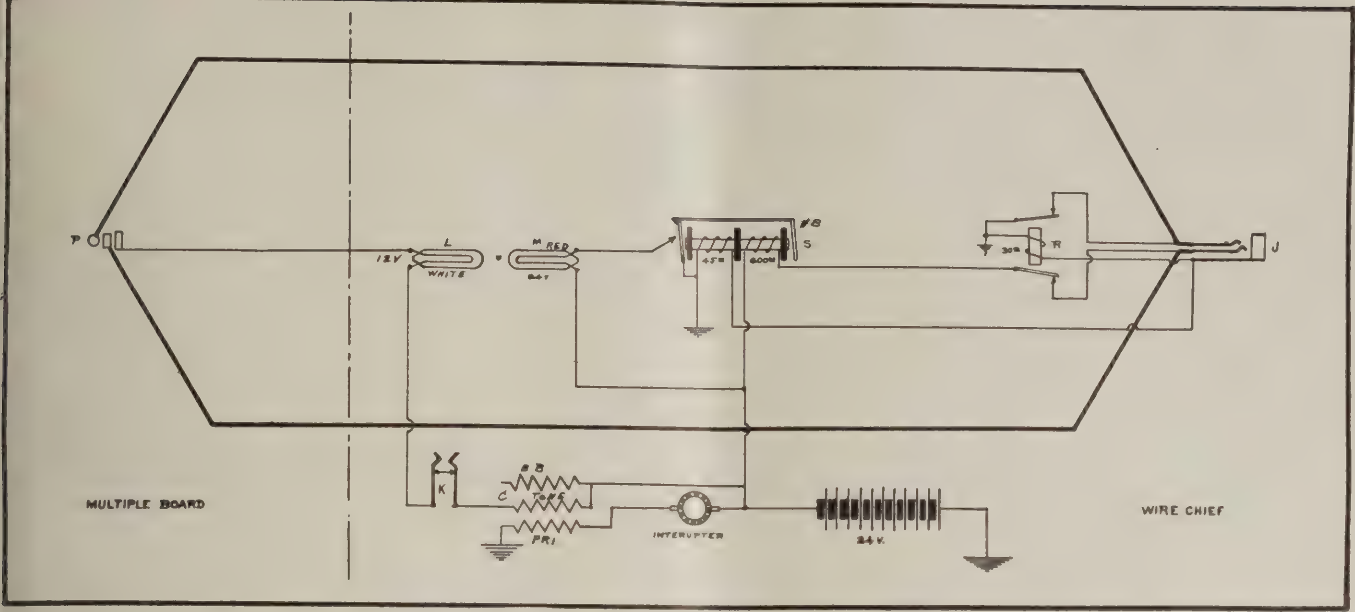


Fig. 17. Wire Chief's Testing Trunks to Multiple Board.

tenths being read directly as a scale division without any estimating, then, since the constant for the voltmeter is, in this case, .00005, 119 scale divisions, each (1/10 volt) gives a Cv equal to .00595, then $Ct = .00595 \times 10 = .0595$ amp., the total current through the ground. Since the drop across the shunt is 11.9 volts the drop due to the ground must be .1 of a volt, therefore $R = \frac{.1}{.0595} = 1.68$ ohms. This is practically one-tenth of the resistance as measured by first method and is much more accurate. To be just as accurate as the first, we will suppose our reading is 11.99, then $R = \frac{.01}{.05995} = .166$ ohms.

The above method can be simplified in the following manner:

The resistance of the Vm = 2,000 ohms.

The resistance of the shunt = 222 ohms.

The combined resistance $= \frac{222 \times 2{,}000.}{222 + 2{,}000} = 200$. Now, knowing the drop across the shunt as measured by the Vm equals 11.9, the drop across the ground must equal .1, therefore the resistance of the ground must be $\frac{1}{119}$ of 200 ohms or 1.68, as above.

Low resistance grounds such as described above, are practically described as "dead" grounds and will show as such by the first method of testing, as we saw by that method that the lowest resistance which could be anywhere near accurate was 16.8 ohms. A variation of one-tenth volt might occur in the battery voltage while making the test, so the second method should be used when the first shows a high reading on the voltmeter. Furthermore, low resistance grounds as described, can usually be cleared at once, since the line or cable forms quite a portion of the total resistance and would thus indicate a ground within the exchange.

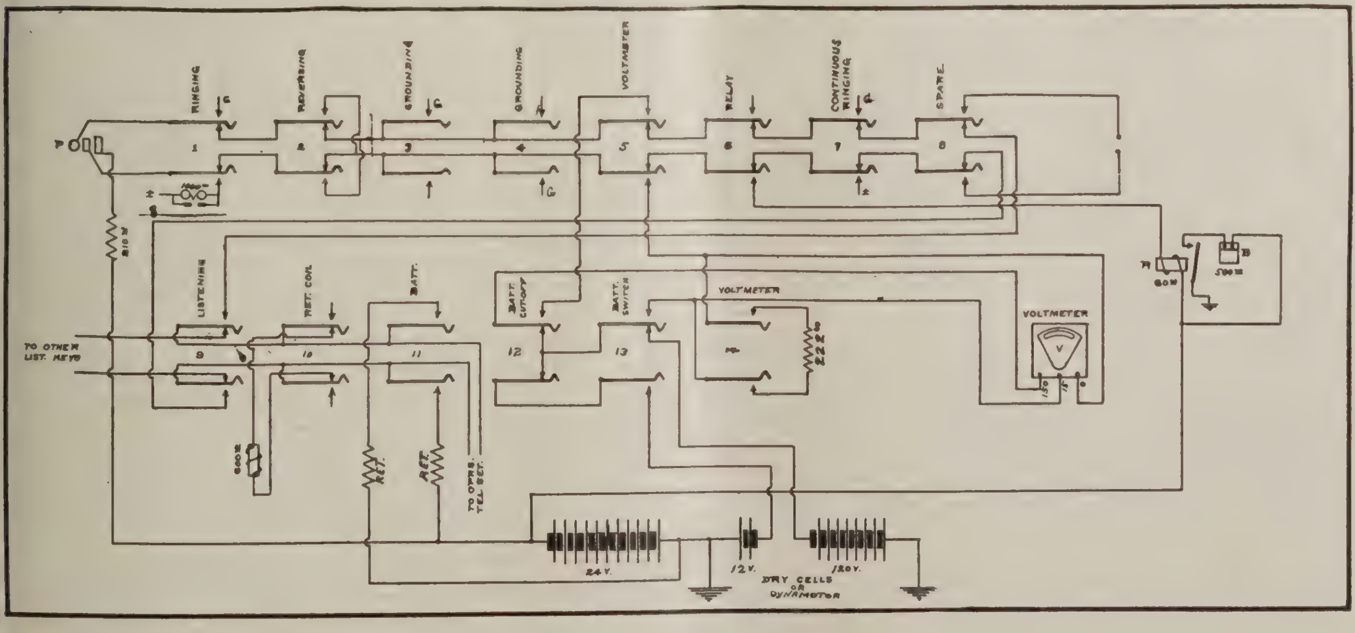
THE TEST FOR CROSSES.

In testing the two wires of a line for crosses, ground the tip by throwing the key No. 3 so as to throw a ground on the tip side and test the sleeve side for grounds. If the line is crossed, the resistance of the line and cross can be measured. If the cross itself is of low resistance, the distance from the exchange can be readily calculated from the size of the wire forming the line. The resistance of each line should be measured with the instrument short-circuited at a time when the line is in good condition. This resistance should be carefully recorded and much variation from it will indicate trouble.

TEST FOR CONTINUITY OF CIRCUIT.

First test the line for grounds and crosses. If clear, and there

Fig. 18. Wire Chief's Testing Cord Circuit.



is reason to believe that the line is open, it can be readily determined by ringing out on the line which will ring the bell through which generator is wired to key No. *1*, Fig. 18, if the line is not open. If it is open, then the bell will fail to ring. If the subscriber's telephone is off the hook, the tests perviously described will show it, and consequently the continuity of the circuit.

TEST FOR FOREIGN CURRENTS.

Suppose the source of foreign current is a three-wire grounded system and the tip side of the line is crossed with the positive leg, throw the reversing key No. *2*, then the voltmeter key No. *5*, then No. *12* and the grounding key No. *3* for tip side of line. The voltmeter will show the voltage of the cross. If the positive leg is crossed with the ring side of line, leave the reversing key in normal position and throw No. *5*, No. *12* and No. *4*, as before. If the negative leg is crossed with the tip, make same test as for positive leg crossed on ring. If the ring side is crossed with the negative leg, make same test as for positive leg crossed on tip. Any source of current which is grounded can be tested as above. Of course it will not be known which one of the above conditions exist when the test is begun, consequently, considerable care should be exercised so as not to injure the voltmeter. The ground leads leading from keys No. *3* and No. *4* should be fused very low as serious results might follow, i. e., if the tip were crossed with the positive leg of a grounded three-wire circuit, the throwing of a ground on the tip would be a short circuit on the power mains and if the heat coil did not blow for some unforseen reason, disastrous results would follow. Suitable fuses in the ground leads will obviate this danger.

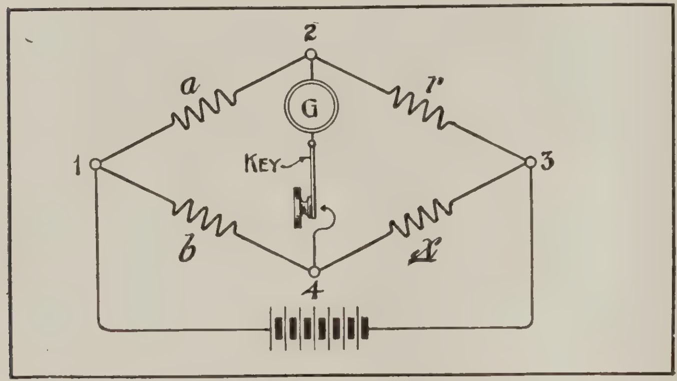


Fig. 22. Diagram of Wheatstone Bridge.

FROM THE MAIN DISTRIBUTING FRAME.

All of the tests so far described can be made from the main distributing frame through the agency of circuit, Fig, 16, "Testing trunks to the main frame," but it is usually easier to test through the multiple board, besides the latter gives a complete test of the line from the local board through all the cable and distributing frames. Should a break occur in either of the line wires out on the line or in a cable, the ends being insulated from ground and other wires, the only method is to make capacity tests. Crosses or grounds frequently have considerable resistance right in the "faults" so their location cannot be determined by the voltmeter methods described. Then these tests should be supplemented by the Varley Loop test, using a wheatstone bridge, or by the Murray Loop test if the wheatstone bridge is not available but a standard resistance box is at hand.

To illustrate the foregoing methods, suppose there is a ground on the ring side of the line. With the testing plug, Fig. 18, inserted in the testing trunk circuit, Fig. 17, the plug *P*, of which is inserted into the jack of the line in trouble, throw key No. *6*, Fig. 18. Suppose the ground is such that the relay does not operate. Next throw key No. *4*, then No. *5*. This will give the full voltage of the high battery or dynamotor, i. e., 120 volts. After obtaining this reading, restore key No. *4* and take a reading with key No. *5* thrown.

Suppose this reading is 112. Therefore by substituting these values in the formula

$R = r\frac{(d-d')}{d'}$ we get

$$R = \frac{20,000\ (120-112)}{112} = 1,428 \text{ ohms} +$$

Such a ground as this while it might not, owing to adjustment give the relays enough power to pull up, it would cause it to stick after it was once pulled up, due to the subscribers "calling in."

VARLEY LOOP TEST

To illustrate the application of the Varley Loop test using a Wheatstone bridge, suppose that by the preceding voltmeter method it was found that the voltmeter gave a reading when testing for grounds of 110 volts.

By the formula $R = \frac{20,000\ (120-110)}{110}$

$R = 1,818 +$ ohms. But this will not determine the distance from the exchange of the ground. In so far as one could tell it might be within a few rods of the exchange, or it might be several miles. As all our readers are familiar with the diagram of the Wheatstone bridge if not with the instrument itself, it only remains to show how it can be applied to measuring the resistance of above fault.

Fig. 22 shows the familiar arrangement of the Wheatstone bridge. Every cable usually is supplied with spares, consequently a good wire will be available and the bridge can be connected as shown in Fig. 23, for the Varley Loop test, g = resistance of good wire, and $x + y$ = resistance of bad wire, (therefore, L or the loop made by joining the far ends of the wires) $L = g + x + y$. Now it is evident the ground bears the same relation to the bridge as the point *3*, in first diagram while the rheostat arm *r* consists of the unplugged resistance necessary to get a balance of the galvanometer and the resistance *y* of the bad wire from the far end of the cable. The resistance *x* of the bad wire from the fault to the bridge constitute the unknown arm. When balance is obtained the equation of the bridge is $a\,x = b\ (r + g + y)$ (1).

But $L = g + x + y$ (2).
therefore, $g + y = L - x$ (3).
Substituting 3 in 1, we have $a\,x = b\ (r + L - x)$ (4),
or $a\,x + bx = br + bL$ (5),
and $x = b\frac{(r + L)}{a + b}$

If the bridge arms *a* and *b* are equal we have $x = \frac{r + L}{2}$ (7) L will be known either from previous records or can be calculated very closely from the size and length of the wire. It will also be noticed that the above formula gives the resistance of the bad wire from the fault to the exchange irrespective of the fault, *e. g.* let the two bridge arms be: $b = 10$ and $a = 100$ and $r = 370$ to give a balance, and let $L = 180$ ohms the resistance of a loop or two wires of No. 19 B. & S. copper cable wire two miles in length. Each wire in this case measures 45 ohms per mile.

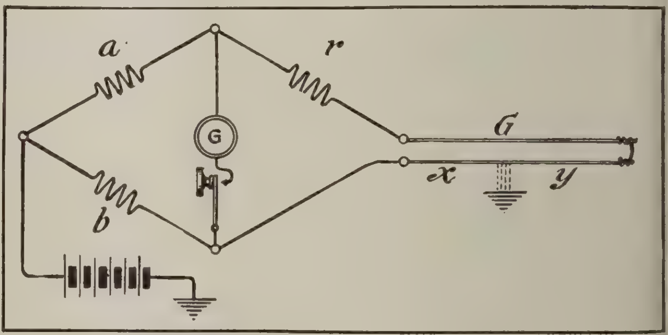


Fig. 23. Varley Loop Test.

Therefore by (6) we have $x = \frac{10\ (370 + 180)}{10 + 100} = 50$ (8). Now, since the resistance per mile of the wire is 45 ohms, we have the length of the wire from the exchange as 1, 1/9 miles. If the wire from the bridge to the wire in the cable being tested, is of appreciable resistance it can be measured and its resistance substracted from the value of x.

MURRAY LOOP TEST.

If a wheatstone bridge is not available for making the Varley Loop test, then another loop test known as the "Murray" can be used provided a standard resistance box or two noninductive resistance coils (resistance known) and a galvanometer are available. In Fig. 24, are shown the connections for the Murray Loop test. It is evident that the two resistance coils are joined at *1*, or if resistance box is used, which will be more convenient to adjust to and balance, any two intermediate coils are joined by a plug and the terminal posts will correspond to *2* and *3*. After a balance is obtained by adjusting the coil or resistance box, the equation of balance is

$a\ x = b\ (G + y)\ (1),$

and since $L = G + x + y$, or $G + y = l - X,$

$ax = b\ (L - x)\ (2),$

or $ax + bx = bL\ (3),$

and $x = \frac{bL}{a + b}\ (4).$

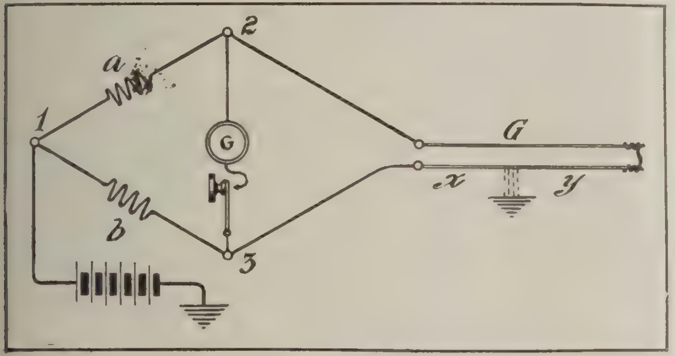


Fig. 24. Murray Loop Test.

Where the letters have the same significance as under the Varley loop test, it will readily be seen that the two resistances $a + b$ can never be equal for then we should have $x = \frac{L}{2}$, which could never happen as a part, x could never equal the whole $\frac{(L)}{(2)}$ of a wire except in the extreme case of the fault being at the very end of the wire or point of union with the good wire, which case could hardly happen.

In measuring a wire by this method let $a = 100$ ohms and let $b = 10$ ohms. $L =$ resistance of a loop of two No. 19 copper wires one mile long $= 90$ ohms, this resistance having previously been determined and the wire looped one mile from the exchange.

Then $X = \frac{10 \times 90}{100 + 10} = \frac{900}{110} = 8.18 +$ ohms.

Now, since the resistance of the wire per mile is 45 ohms the resistance per foot $= \frac{45}{5280} = .0085 +$ ohm. Therefore, the number of feet to make 8.18 + ohms $= \frac{818}{.0085} = 962$ feet, approximately, being the distance in feet the fault is from the exchange.

CAPACITY TEST.

Should a wire in a cable become broken, the ends remaining insulated from ground and each other, then a capacity test will be necessary to locate the trouble. Probably the easiest method is to make use of a good wire in the cable same as in the Varley loop test and take a galvanometer reading C on this wire, then another C_1 on the broken wire and a third, C on the good wire with the broken wire joined to it at the farther end. Fig. 25 shows connections for the capacity test. Now let $L =$ length of cable in feet, and $x =$ length of wire in feet to break from the testing end. Then we have $x : I :: cl : c_2 - c + c_1$. Where it is evident that the throw on the whole broken wire equals $c_2 - c + c_1$, therefore $x = \frac{Lc_1}{c_2 - c + c_1}$

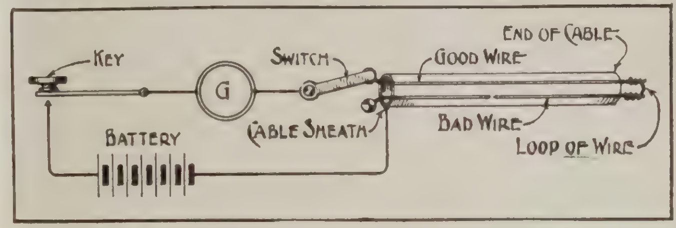


Fig. 25. Capacity Test.

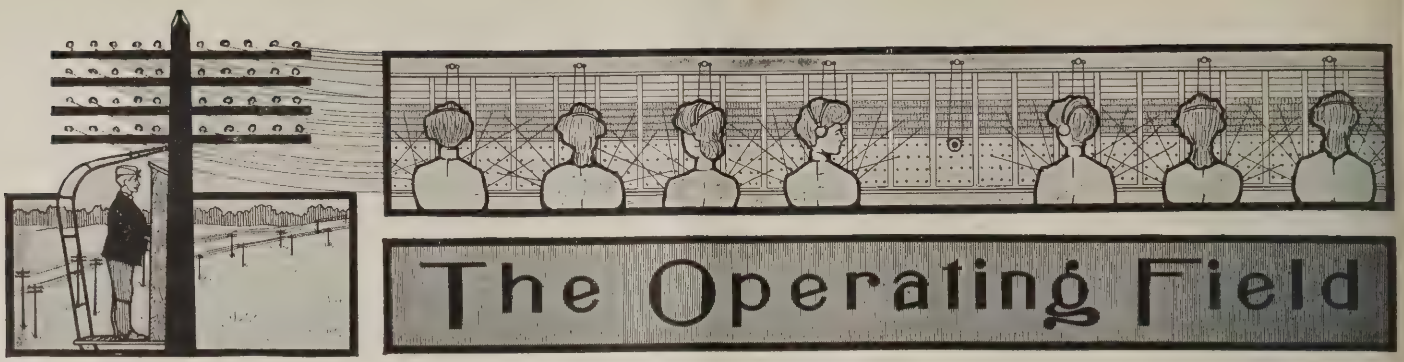
Suppose for example, that $c = 20$ $c_2 = 25$, $c_1 = 15$, and $L = 1$ mile or 5280 feet, then $x = \frac{5280 \times 15}{25 - 20 + 15} = 3960$ feet. The distance from the exchange of the break.

It is well to remember that considerable judgment should be exercised as to what value to place on a capacity test as the breaks are made complex by the manner of insulation at the break. When the insulation resistance, as measured by the voltmeter as already described, shows about one megohm per mile, then the capacity test should not in every case be relied on, but other methods adopted which come more under cable testing than under the description of wire chief's circuits.

PROGRESS OF THE LOS ANGELES HOME TELEPHONE COMPANY

THE new exchange in Los Angeles, Cal., is now an assured success, and the greatest difficulty is found connecting the many desiring service. There are now in use over 7,000 main lines and over 9,000 instruments. There is absolutely no trouble in making collections, the satisfaction with the service being general. The Home Co. has made an extra effort to take care of all special equipment desired by a patron and has now in use thirty private branch exchanges having from 10 to 200 lines each; besides this, there are over 200 special devices for convenience of patrons, at their places of business and residences. An addition to the switchboard is now being made of nine operators' positions and a trunk section. Preparations are also being made to take care of the toll lines, which will be connected November 1. The pole line and cross-arms are in place between Hollywood and Los Angeles, and the wires are now being strung. A handsome building is nearing completion at Hollywood, the architecture being the mission style; this exchange will open with about 150 telephones. The lines to Pasadena are completed and this exchange, with its 1,000 or more telephones, will probably be in operation about November 1st. Long Beach, with about 200 lines, will be ready by October 15th, and the other small towns in rapid succession.

The Los Angeles board has now 120 lines to an operator, owing to the slow delivery of material and the urgent demand for service. This will be increased to 140 or 160 per operator. This is feasible because of the fact that the entire service is main lines only and the number of calls per line is less than where party lines or a mixed system exists. The stock of the Home Co. is now selling at 51, with few sellers. The entire plant was formally turned over by the "Empire Construction Co." to the "Home Telephone and Telegraph Co.," September 15th, and to take effect October 1st. Mr. Van Liew, formerly treasurer of the "Empire Co.," and provisional manager for the "Home Co.," was placed in full charge as general manager and assistant treasurer of the "Home Co." The directors are: Col. I. M. C. Marble, president; A. B. Cass, assistant president; F. F. Graves, secretary and treasurer; Thos. W. Phillips, H. W. Hillman, W. C. Patterson, Oscar A. Trippet.



The Operating Field

ANNUAL MEETING OF FEDERAL COMPANY.

THE annual meeting of the Federal Telephone Company, of Cleveland, Ohio, was held in East Orange, New Jersey, on October 1st. The only business before the meeting was the election of new directors for the ensuing year, which resulted in the selection of the following:

F. S. Dickson, E. W. Moore, C. W. Wason, J. B. Hanna, Jas. S. Sprankle, H. A. Everett, Jas. B. Hoge, B. Mahler, Jas. B. Dill, R. A. Harman, and J. W. Marsh.

A business meeting of the new directors will be held in Cleveland, in a short time, at which new officers will be elected. Ralph M. Judd, treasurer of the company, in discussing the affairs of the Federal Company, said they were brighter than they had been for a long time. All of the subsidiary companies, with the exception of one small one, are earning all their fixed charges. At the meeting to-day it was decided to declare a 1½ per cent. quarterly dividend on the new six per cent. stock issued three or four months ago by the United States Telephone Company, the long distance branch of the Federal.

The outlook for the Cuyahoga Company, which operates in Cleveland, is very bright. It has at present nearly as many subscribers as the Bell Company, and it has forced the Bell Company to make almost any sort of a rate to secure a subscriber. The service given by the Cuyahoga Company, although greatly hampered by its present poor equipment, is in every respect equal to that given by the Bell Company. In a very short time its new switchboard, with a capacity of 18,000 lines, will be installed, which will bring its service up to the top notch.

It has been practically decided to increase the rates for service in Cleveland as soon as the new switchboard is installed. The officers of the company believe they have a legitimate right to do this, regardless of the action of the city council. The rates of the subsidiary companies are also being raised to put them on a sound financial basis. In no instance, however, are the rates as high as those charged by the Bell companies, and there has been practically no opposition to the raising of the rates.

NEW YORK ASSOCIATION WANTS INFORMATION.

THE New York State Independent Telephone Association has issued the following circular and is sending it to all of the companies operating in the state. For the benefit of any who may have been overlooked it is here published:

"A strong State Association, with more complete information and statistics as to the strength and conditions of the Independent Telephone movement in all parts of the State, is essential to the general welfare, and valuable to all Independents. Reliable statistics are desired, as only such have value. While it is a duty each company owes to the common interest to promptly furnish proper information to the Association, when requested so to do, in this instance, however, each is urged to co-operate by furnishing the information requested, as a personal favor to those who, without any advantage or gain individually, are endeavoring to collect these facts for the purpose of compiling and publishing them for the use of the members of the Association, and others interested in the Independent movement.

If there is objection to answering any question or parts of questions herein asked, omit the same, and send answers to the rest, especially to numbers 1, 2, 8, 10, 12 and 16. Also please send a map or rough sketch of all independent toll lines and connections in your system, territory or county—using either pencil or ink, and any kind of paper. The essential thing is to forward a sketch or map of the lines in actual operation; those under construction or to be built this fall to be indicated by dotted or broken lines. It is intended to use this information to get out a State map, showing all Independent lines; and also showing exchanges and stations as far as the same can be obtained. Therefore, upon the sketch or map sent to the secretary, please indicate exchanges by (◉) and toll stations by (●). Do not delay sending the map in order to make up a fine sketch, but forward promptly a rough draft or map, unless a better one is already prepared. Can the Association depend upon you in this matter? We thank you for your co-operation."

Please forward your report to

J. B. WARE, Secretary,
536 Ellicott Square.
Buffalo, N. Y.

The following information is desired:

1. Name of your company. 2. Location of main office, county and state. 3. President of the company's name and his address. 4. Secretary of the company's name and his address. 5. The managers' name and his address. 6. If your company is incorporated, when was it incorporated, what date did service begin? 7. Bonds issued, dollars; stock issued, dollars. What dividends paid? 8. Total number of telephones in service. Made by whom. 9. Number of farmers' telephones connected. Are they included in answer to No. 8? 10. Total Bell telephones. Is Bell switchboard, central energy or magneto? 11. The name of the manufacturer of your switchboard. Is it central energy or magneto? 12. Give the names of the companies which connect their lines with your company, the locations of their main offices, their active men, and an estimate of the number of telephones they have. 13. If you are operating more than one exchange, state whether switchboards are central energy or magneto, and give the location, switchboards, telephones in service, number of Bell telephones and Bell switchboards in each town. 14. Give the location, telephones, number of Bell telephones and Bell switchboards in each place where you operate a toll station. 15. Give the miles of poles, miles of copper wire, miles of iron wire on the toll lines that you operate. Give miles of metallic circuits and miles of grounded circuits. 16. What is estimated increase of telephones in your territory up to January 1, 1904? 17. What is estimate of the increase in miles of pole line up to January 1, 1904?

TRAFFIC AGREEMENT BETWEEN MARYLAND CO. AND UNITED CO.

GENERAL MANAGER WEBB, of the Maryland Telephone and Telegraph Company, in announcing the conclusion of a traffic agreement with the United Telephone and Telegraph Company, of Pennsylvania, says: "Under the agreement the Maryland Company gets a connection with Hagerstown, Md.; Winchester, Va.; Chambersburg, Carlisle, and Harrisburg, Penn.; and many other places through a large territory." The Pittsburg and Allegheny Telephone Company, in which the Maryland Company is largely interested, and the Johnstown Telephone Company have nearly completed a line between Johnstown and Pittsburg, while the United Company is building a fourteen-mile line into Johnstown. When this work is finished the Maryland's service will be extended to Johnstown and Pittsburg, and will open up the western territory in Pennsylvania and into Ohio, Illinois and

Michigan, where the Pittsburg and Allegheny Company has lines in operation. The United States Long Distance Telephone Company has just built a line into Cincinnati, and the Maryland will connect with it through the Pittsburg and Allegheny.

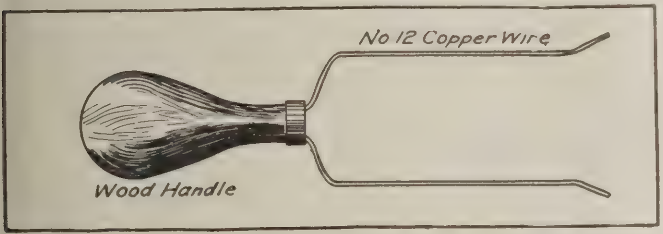
SEVENTH ANNIVERSARY OF CAROLINA CO.

THE notice of the payment of its regularly quarterly dividend by the Carolina Telephone & Telegraph Co., of Tarboro, N. C., recalls the fact that it was just seven years ago that a small company was organized for the purpose of building a telephone exchange there. The promoters did not receive much encouragement, as some of the best business men said that it would not be profitable, as there was no need for an exchange, and that the town was too small for it. Notwithstanding the confidence displayed by the young men that organized the company by subscribing to sufficient stock to start it, even the most sanguine did not realize that it would ever assume the proportions that it has. This company is now operating exchanges at Fayetteville, Red Springs, Maxton, Dunn, Smithfield, Wilson, Scotland Neck, Kinston, Washington and Tarboro, with good metallic copper toll lines extending through the State from Virginia to South Carolina. The company has been a success from its beginning, paying dividends every quarter on both its preferred and common stock.

A SIMPLE GROUNDING ARRANGEMENT.

By Chas. Claydon.

THE drawing shows a contrivance which though very simple, is effective. It is to be used on a bridging grounded telephone line to ground the line and cut out the instrument when a storm comes up. It merely consists of a fork of wire which is set in a wood handle. The fork is shaped so as to fit between the two bind posts of the telephone. It would of course work as well without the handle but the handle makes it more difficulty to loose and prevents the possibility of a shock if one is standing on a damp floor while short circuiting the instrument. When a storm comes up simply place the prongs of the fork between the line bind post and the ground bind post of the telephone and any electric charge will pass to ground without damaging the instrument.



TOWN PRESENTS FRANCHISE TO COMPANY.

AT its last meeting the Borough Council of Ligonier, Westmoreland County, Pa., took the very unusual step of passing an ordinance granting a franchise and then presenting it to a corporation which had not asked for it. The recipient of the gift is the Pittsburg-Johnstown Long Distance Telephone Company, closely affiliated with the Johnstown Telephone Company, and, it is stated, that this corporation has been asked to run its line into the town and establish an exchange there, the Bell system being the only one now doing business in the town. As the Johnstown-Pittsburg line is laid out to run not far from Ligonier, it is expected that the franchise so freely given will be taken advantage of.

TELEPHONE DIRECTORY IS THE BEST DIRECTORY.

A MAN in a hurry stepped into a Broadway, New York, store the other day and asked to look at the city directory. "City directory?" replied the proprietor. "We haven't had a directory for three years. We take all our addresses from the telephone book and find it answers every purpose." He produced the telephone directory and the address sought was quickly found.

The use of the general telephone index as a directory is growing. It is handier than the cumbersome city directory, and is consulted regularly in hundreds of busines houses instead of the old stand-by. The telephone list has grown until it contains not only the addresses of every man engaged in business in Greater New York, but of the majority of professional men, as well as all public and private institutions. Practically all persons of any pretensions to income now have a telephone in their homes. In addition there are many busy and important towns in New Jersey and Long Island that are handily catalogued in precise alphabetical form in the telephone book. The fact confronts the directory company that nearly everybody who is anybody has his name and address in the telephone book. The directory itself appears to be of value nowadays chiefly for hunting up the smaller fry.—*New York Press.*

THE DEMAND FOR TELEPHONE ENGINEERS.

LATELY it has been impossible to supply the demand for trained telephone engineers. There are an ample number of men in the telephone field who while their practical training is all that could be desired and who are entirely competent to construct and handle the smaller plants, they are not conversant enough with the theoretical to enable them to cope with the engineering problems of the larger exchanges. The technical schools over the country are annually turning out bright young men who have the book part of engineering at their fingers' tips, but they, on the other hand, do not possess a sufficient acquaintance with things as they really are in engineering to be of immediate value in engineering departments. All of the large companies take on their staffs each year many such young men and train them for what is to come. The salaries paid at the start by the companies to these young fellows show that their services are not considered especially valuable, as the compensation is about the same as that of a day laborer, or even less. What is wanted is a practical man with a theoretical training, and the call for such men indicates that there are not many who possess these qualities who are not comfortably settled in some good position.

It seems strange that comparatively so few of the men who have had the experience which would make them excellent telephone engineers avail themselves of the opportunities which men of this day can have to secure the technical training to equip them for a higher class of work. It will be conceded that it is pretty hard for a man who has never had a great deal of schooling to dig his knowledge from text books which were written for those better versed than he, but now there are correspondence schools which prepare courses covering the different engineering branches, for those whose early education has been limited. These schools will take a student who has only the ability to read and write. He is started on arithmetic and carried up through the more difficult subjects that an engineer must be conversant with. All of these correspondence institutions have courses in telephone engineering which are thorough. The American School of Correspondence in Chicago is conducted in conjunction with the Armour Institute, which is an endowed institution, as the other educational institutions of the country, and is doing much toward the spreading of knowledge and the equipping of telephone men for the field of telephone engineering. The American Telephone Journal is heartily in accord with the correspondence instruction movement, and to give substantial aid to it will allow 25 per cent. of the cost of advertising to any institution of this nature that uses its advertising pages.

TELEPHONES IN HARDIN COUNTY, IOWA.

HARDIN COUNTY, IOWA, has forty-two telephone lines which aggregate over 700 miles of line now completed. The total assessed value of these lines is $20,855.73. This is an increase of about $10,000 over the assessed value of all telephone lines last year. A number of other lines are in course of construction and when completed every part of the county will be in touch with all other parts of the county.

The Editor's Page

THE KELLOGG COMPANY'S MASQUERADE.

In its recent issues the American Telephone Journal has pointed out the uses to which Bell interests are putting their purchase of the Kellogg Switchboard and Supply Company, as material for a press campaign. If this sort of work was merely spasmodic or incidental, we would be inclined to let the subject drop. But it is evident from the widespread publicity that is being given to the sort of matter which we quoted in our last two issues that the Boston press bureau has settled down to an organized campaign. That being the case we deem it our duty to go fully into this matter and to keep at it until the situation shall have resolved itself into its proper shape. Accordingly we shall make the Kellogg case our leading subject of editorial discussion until one of two things shall have happened.

Either the company must cease to masquerade as an Independent concern, or it must demonstrate legally and unequivocally that the Bell interests now in control have been ousted. Of course, this latter condition can be brought about by a sweeping victory of the minority stockholders who have instituted suit to set aside the sale of the Kellogg stock to the Western Electric Company interests. But it needs no deep reading of the law to realize how improbable is any such outcome of the pending suit. As matters stand now, nothing much short of a miracle could be invoked to set aside the transaction that landed the Kellogg stock in the hands of the Bell interests. The sale under power of attorney is just as binding as though made by the principal in person. Only one allegation might be advanced with any hope of success to set the sale aside—that the principal was mentally incapacitated when he executed the power of attorney. And even the most sanguine would hardly venture on this course, for it is conceded by all who know, that such an allegation would have no foundation in fact.

The people at interest, and they comprise every man connected with Independent telephony, are then confronted by the fact that there is no solution to the present situation except the open branding of the offending company as an allied Bell concern whose main interest it must be to further the cause of the old time monopoly by every means in its power. And this means that its chief aim is and must always be while it remains under its present ownership, to injure the cause of the Independents and to cripple competition. No other conclusion is possible. The efforts of those in interest to obscure the real issue should be sharply discounted and set down for what they are worth. The specious argument that the Bell people bought the Kellogg company as a legitimate business investment, is too absurd to merit serious discussion. Any man who permits himself to be fooled even for a moment by such talk impugns his own intelligence. An Independent manufacturing company that is conducted along legitimate lines must for its very existence foster competition with the Bell. That is its life's blood. The majority of the Independent operating companies now in existence were brought into being by the efforts of the manufacturers.

WILL THE INDEPENDENTS BE DECEIVED?

Every movement for the spread and betterment of the industry, now one of the greatest in the country, has emanated from or had the active backing of the concerns who make the apparatus. The manufacturers are the ones who fought the patent suits or supplied the means for fighting. The manufacturers are the power on which the industry must rely to keep on fighting the suits still at issue. Behind every telephone and switchboard in use in the Independent field stands the guarantee of the maker against the aggressive claims of the Bell. This being the case is it possible to conceive of an Independent concern owned, operated and controlled by the Bell? Surely it needs no deep intelligence to show the impossibility of any such proposition. Whatever may be true of any other industry, in the telephone field the line is sharply drawn. There no individual or corporation may serve both the Independents and the Bell. And it is the Bell company itself that has made and persists in making this condition. The very transaction at issue, the purchase of the Kellogg company, emphasizes this in the sharpest manner, and the way this purchase is being used, playing one side with the operators, and the other side with the public, furnishes proof of the utter hopelessness of ever expecting the Bell to fight fair. It is bushwacking with them always in preference to any other mode of warfare. To meet such warfare is easy enough as the great progress of the Independents has shown.

It requires simply clear reasoning powers, clean cut action and good judgment. These qualities the Independent operators have manifested so amply in the past that we feel justified in believing that they will not be taken in with regard to the Kellogg company under its present status. Only the soft and simple minded will be misled into accepting the statements ingeniously made that the Bell people are willing to foster the cause of the opposition with one hand and the cause of monopoly with the other. The motive behind the Kellogg purchase must be clear enough even to the most obtuse. The Boston gentlemen thought it would give them a strangle hold on their vigorous rivals. Of course any one with a broad business vision would have known the futility of this hope.

But the Boston people have never been particularly famous for their breadth of vision. They are aggravated types of the narrow New England financiers that can hold on and cripple and gouge, but can by no means broaden out and develop. Had it been otherwise, had they been broadminded, progressive business men, there would probably have been no Independent industry. They had the situation firmly in their grasp, but lost control absolutely and forever, because they could not get away from the haughty arrogant idea that they owned not alone all rights, human and divine, so far as the telephone was concerned, but that they owned the people as well. We doubt that any body of men so short sighted as this are going to succeed in palming off the Kellogg Company, the ownership of which they admit, as an Independent concern.

FOREIGN CURRENTS

By "The Arrester."

"TOUCHIN' on and appertainin' to" the Glasgow Corporation Telephone accounts the auditors' report includes some remarks that, while couched in the politest of terms, convey the idea that the official auditors do not give their entire approval to the manner in which the accounts are kept. One of these is as follows: "No depreciation has yet been provided for, nor has any portion of the sum standing at debit of preliminary and general expenses in capital account been written off out of revenue." This remark must be taken in connection with the fact that the net surplus revenue from 21 months' operations has been only about $10,000. The total capital expenditure stood at the end of 21 months at $1,350,000, so that if depreciation had been charged at the modest figure even of 5 per cent., there would have been a handsome deficit of some $80,000 to $90,000. The sum "standing at debit of preliminary and general expenses in capital account," is some $80,000, which was spent on the famous Glasgow Telephone Inquiry of 1897, on reports, estimates, parliamentary expenses, etc. Expenditure of this sort by a commercial concern would be written off out of revenue as early as possible, but in municipal accounts it is kept in as a capital charge. And yet advocates of municipal trading are fond of reproaching companies with having "watered capital." Some other technical points of municipal accounting are referred to by the auditors and they close their report with this remark. "In our opinion the time has now come when the canvassing expenses should form a charge against revenue." If the Glasgow municipal telephone department have been in the habit of charging the expenses of canvassing for new subscribers to capital it would be highly interesting to know where they draw the line between operating expenses and capital charges.

Glasgow Statistics

SOME further particulars of the Glasgow municipal telephone system have recently been published, and the following figures, representing the condition of the system after about two years' actual working, may be of interest:

	May 31, 1903.
Completed instruments	9,122
Partially completed lines	7,387
Switchboard accommodation (lines)	10,826
Number of pairs of cable wires	18,171
Mileage of pairs of wires in cables	14,029
Length of trenching (miles)	127¾
Number of ducts entering exchanges	135
Duct capacity in pairs of wires	31,000
Length of ducts (miles)	127¼
Length of underground cable (miles)	162
Number of ground poles	1,799
Number of roof standards	243

Some of these figures do not mean very much, but our readers may be interested in comparing them with those of their own systems.

How Glasgow Flourishes

THE city telephone system is trying hard to live up to the city motto—"Let Glasgow flourish"—as is shown by these remarks from the report:—"The service generally continues to be acceptable to subscribers, as may be shown by the fact that during the year now ended the number of orders received was considerably in excess of the preceding year, and the traffic during the year has steadily increased, and now reached the rate of 31½ million messages per annum. The messages per subscriber per day vary in the different exchanges from six to twenty-one, the average throughout the system being 13 per subscriber per day. The traffic in trunk messages, particularly in incoming calls, also shows a considerable increase on the previous year. Considerable attention has been devoted to opening public telephone offices for the use of the public throughout the city, there being now 115 in operation. At May 31, there were 9,112 instruments connected, these being subscribed for by 8,145 persons and firms, of which about 4,600 have never been telephone subscribers before. About 800 orders remained to be executed." In reading the above figures it must be borne in mind that in England a call is counted as two "messages," on the ground that a telephone call implies the original message and the reply; so that in American figures the average daily traffic per subscriber in Glasgow would be stated as 6.5 calls. This does not seem very high for a cheap flat rate system.

Average Capital Cost

THE average cost per mile of wire of the London underground system has been given above as $46.40. It is stated that the average length of line per subscriber is 1.35 miles, or 2.7 miles of conductor, making an average cost per subscriber for line plant $125.28. Including the exchange apparatus (and presumably the subscribers' station equipment) the average cost of each exchange line is given as $191.56. Making allowance for a balance of spare wires, amounting to 25 per cent. of the wires in use, such as is necessary, says the Postmaster General, for the efficient working of an exchange system, the average cost per line will be increased to $222.90. This is a big drop from the present figure of $610 per line, and we fancy it will take the Postmaster General some little time to get his average cost per line down to his estimated figure. At $222.90 per line the present capital expenditure would provide for just 25,000 lines. Or, to put it in another way, to bring the plant up to a capacity of 30,000 lines will require the increase of the capital expenditure from $5,560,000 to $6,687,000. We shall be very much surprised if even when the Postmaster General has spent that handsome sum on his London system he is able to show anything like 30,000 working lines.

Coincidences and Differences

MUCH has been made in this discussion of the coincidences that occur between the Glasgow statement and that of the Postmaster General relative to the new London system. Mention was made of these points in some previous notes in this column, but the Glasgow authorities seem to have seized with avidity the resemblances and left the differences severely alone. The most curious coincidence is that the number of stations connected shown in each report is identical, 9,122. That makes a splendid peg to hang comparisons on, but though it is a most conspicuous one, it is almost the only fact at all common to the two statements. Glasgow has been working for two years, London for one only. Glasgow has a flat rate of $25, London has message rates mainly and a flat rate of $85. Glasgow has put in an antiquated system, London has worked on the most modern lines. Glasgow tied itself to a fixed cost per line and apparently tried to justify that by putting in plant piecemeal. London set itself no such stumbling block, but built for a large development, putting in 100,000 miles of wire, with but a few thousand subscribers in sight. Glasgow hates the mention of depreciation as the devil hates the sight of holy water, London cheerfully puts depreciation into the accounts. Indeed, but for the fortuitous coincidence of an identical figure for stations connected—though referring to different dates, two months apart—it is hard to see what serious comparison can be made between the two statements.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

TELEPHONE COMPANY A COMMON CARRIER.

IN the case of the State *ex rel.* Thorntown Co-operative Telephone Company, *vs.* Lebanon Telephone Company, a suit for a writ of mandamus to compel the latter company to connect with the former, Judge Artman held the answer of defendant to the petition insufficient and practically decided in favor of the petitioner. In his opinion he stated that the Lebanon Company is a common carrier, and as such cannot discriminate between companies seeking connections with it; that it is bound, under the law, to admit all seeking such service on equal terms, and that the public duty of a common carrier cannot be abrogated by a private contract.

The answer filed by the defendant alleges that as originally constructed the Lebanon Telephone Company was limited to the territory within the corporate limits of Lebanon, and the territory immediately adjacent thereto, and was operated solely for an interchange of communication between its patrons. The court held that if the answer alleged such to be the present situation, it would have been a good defense, but that when the company became general, it was bound by law to treat all other companies alike under like conditions.

The defendant, in its answer also averred that it had entered into contract with the Thorntown Telephone Company, whereby it was prohibited from furnishing service to any other company in Thorntown. The court held that its duties as a common carrier, being imposed by law, could not be abrogated by contract, but that a contract in contravention of the public duty is nullified by the law. The defendant further asserted that exchange service between it and the Thorntown Co-operative Company could only be provided for by contract, and that the court had no power to make this contract. The court conceded this proposition, but asserted that the court had no power to compel the making of a contract, although the actual making of it was left to the defendant.

In conclusion the court said that the corporate existence of the relator had been criticized because it was organized for mutual benefit and not for financial gain. In answer to this contention, the court stated that the law did not require that a telephone company should operate for financial gain. Under the law, each patron might be a stockholder, and the business of the company may be operated for their mutual benefit, on the contributive basis of expense by the stockholders. The law does not specify on which plan a telephone company should be operated. The relator asserts that it is able to do business upon the same terms as the other companies. If this was true, the defendant needed not to concern itself whether the relator operates upon a dividend basis or not.

THE RIDLEY PARK TELEPHONE FRANCHISE.

THE suit for injunction brought by the Keystone Telephone Company against the Borough of Ridley Park, Pa., has been decided by the court in favor of the Borough. A franchise was granted to the company upon the condition that local telephone service might be had by the residents of the borough on or before March 1, 1902. The company was required to furnish a bond of $1,000 for the faithful performance of its agreement. If it failed to complete the construction of the line before the date fixed, it was to forfeit and pay to the borough the sum of $200, payment of which was also secured by the bond. The completion of the line by March 1, 1902, was expressly declared to be a condition precedent. The company failed to complete its line by the given date, and on March 7, 1902, was notified by the borough to remove its poles. On the company refusing to do so, the city threatened to remove them itself. It was to prevent the carrying out of this threat that the company wished the borough enjoined.

The court said that the failure to comply with the condition precedent as provided by the ordinance, ended the rights of the plaintiff to occupy the streets of the borough, and the borough had the right to cause the removal of the poles and wires. The argument that the borough should not be permitted to enforce the conditions, because it did not choose to proceed before the next February, would have had force, said the court, had the borough remained silent and permitted the company to erect its lines and expend money after March 1, 1902. The borough, however, promptly notified the plaintiff that it had forfeited its rights under the ordinance, and ordered it to remove its poles. The claim of the borough that it might occupy the street of the borough without its consent, was therefore not sustained.

LINE ERECTED BEFORE OFFICIALS WERE ELECTED.

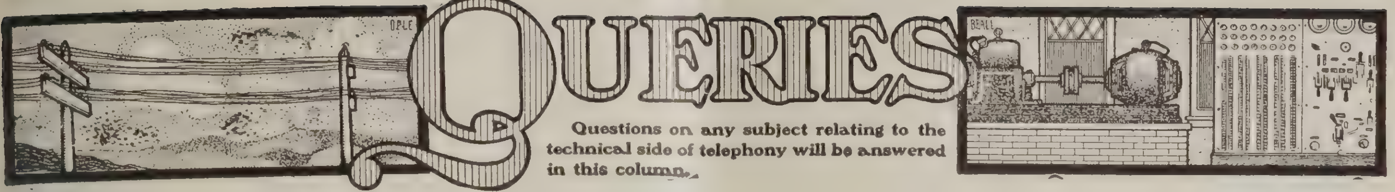
THE equity suit of George C. Hartline, John R. Folk and David Dudore, citizens and taxpayers of Mt. Penn borough, for that borough, against the Consolidated Telephone companies, has been settled. After the borough was incorporated and before the borough officials had been elected, the telephone company started to string its wires through the town. The three plaintiffs then instituted the suit against the company and had an injunction issued by the court restraining them from running their wires through the town until they had been granted the franchise by the town council. Recently the town council passed an ordinance giving the franchise to the company. The company is required to pay an annual tax of $1 on each pole in the borough. They are also to pay the costs of the suit.

HORSE FRIGHTENED BY FALLING WIRES.

CHARLES L. MOREY, of Commack, N. Y., recovered a verdict of $700 against the New York and New Jersey Telephone Company last week. Morey is an elderly farmer. He was driving along the public highway in East Northport, while the employees of the defendant company were putting up telephone wires. Plaintiff claimed that one of the wires snapped and fell near his horse and frightened the animal so that it ran away and Morey was thrown out. He sustained fractured ribs and was otherwise injured. He sued for $5,000. The defendant claimed that Morey had a spirited young horse, and that some hens rustling the leaves along the highway were what frightened the animal.

JUDGMENT AGAINST COMPANY IN HALF AN HOUR.

RAYMOND E. WARDLEIGH, minor, of Salt Lake City, Utah, was recently awarded judgment against the Rocky Mountain Bell Telephone Company, for injuries received last June by the falling of a pole which the company's linemen were erecting, the pole striking the boy and breaking his leg. Judgment was entered by consent of the defendant and a guardian appointed for the boy. The whole proceeding took less than half an hour.



Questions on any subject relating to the technical side of telephony will be answered in this column.

TROUBLE WITH NOISY TRUNKS.—(208.)

Will you kindly explain the cause of the following trouble. The trunks between two of our exchanges are wired as shown in Fig. 208a. They are outgoing at *A* and incoming at *B*. At *c* and *d* are two repeating coils. At the outgoing exchange, the center point of the secondary winding is wired to the contact of the multiple jacks, the other side of the contact being connected to the ground through 8 cells of Fuller battery. At the incoming end, the middle point of the secondary winding is connected to one terminal of a magnetic keyboard signal. The other terminal is grounded. You can see that the trunk is wired for automatic disconnect signals. There are 8 trunks altogether wired in this way. The line is partly underground cable, partly aerial cable and partly open wires. Some time ago three of these trunks became noisy, the noise increasing until conversation became impossible. The following tests were made: At exchange *A* the line was opened at the main rack and tested both out and in. Both tests showed O K, but upon closing through it again tested noisy. At exchange *B* the line was opened at the main rack and tested out and in, the former test showing grounded and the latter O K. When testing the line from *B* towards *A*, it it is opened on the main rack at *A*, it shows clear. But when testing from the main rack "in," at *A* it shows clear, apparently proving that there is no trouble in the exchange. Can you give me any light on the question?

F. D. N.

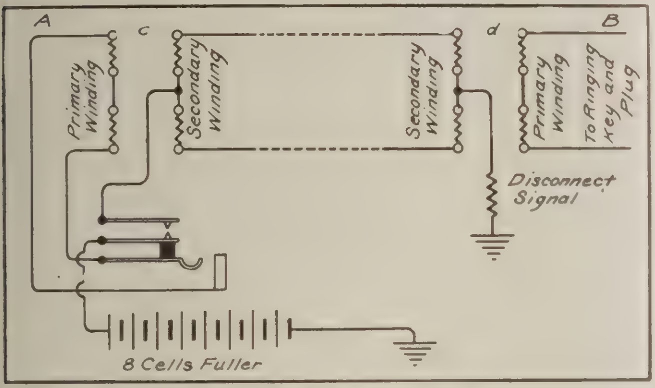


Fig. 208a.

It is difficult to give an intelligent answer to your question without an inspection, but we suspect that your trunk is out of balance and will give you the following explanation, which possibly may be of service to you. In Fig. 208b is shown the condition that obtains when the operator has plugged into the trunk jack at the outgoing end. The battery *c* is grounded at *g* and connected to the middle point of the secondary winding of the repeating coil *a*, while at the incoming exchange, the middle point of the secondary of *b* is connected to ground at *g'* through the coil of the disconnect signal. Current flows from *c* to the point x, and there splits, one part following the winding *1*, the conductor *d*, and the winding *3*, while the other part follows the coil *2*, the conductor *d'*, and the winding *4*. These two currents unite at x and flow to ground through x'. If the resistance of one path equals that of the other, the current flow in one path will be equal to that in the other. Now, the current flowing through *1*, being equal and opposite to that flowing through *2*, the magnetizing effect on the core of the repeating coil of the one is neutralized by that of the other. A similar condition obtains at the repeating coil *b*. Therefore there is no induced current produced by this current in the primaries of *a* and *b*, and the line is silent. Should, however, the resistance of one path be reduced below that of the other, the current flowing in the two paths will no longer be equal, but will be greater in the path whose resistance is the lowest. Suppose, for example, that the resistance of the path *1—d—3* be made higher than that of *2—d'—4*, due to a bad joint somewhere on *d*, or to a ground on *d'*, the current flowing through *2* and *4* will be greater than that flowing through *1* and *3*, and its magnetizing effect will no longer be neutralized by that of the other. Induced currents will be produced in the primaries of *a* and *b*, and the line will test noisy. Under the above conditions, these induced currents will be aggravated by earth currents flowing from *g'* to *g* or the reverse by way of the circuit. When you open the line at the main rack, you remove the grounds and repeating coils and the lack of balance on the line is no longer able to produce currents. Measure with the Wheatstone Bridge, the resistances of *1*, *2*, *3*, and *4*, and see that they are equal. Measure the resistance of *d* and *d'*, and make one equal the other, by going over the joints carefully and, if necessary, changing the conductors until two are obtained whose resistances are equal. When this is accomplished, the line will be balanced and the noise will undoubtedly disappear. Should this thouble occur again, write us, and we will suggest a different circuit to use, which, while it requires more apparatus, will give better satisfaction.

LIFE OF COPPER WIRE.—(209.)

How long does copper wire last?

L. A. T.

The life of copper wire is yet undetermined. Copper is practically unaffected by the gasses and vapors of a city atmosphere, and even where it is exposed to the action of the winds blowing directly from the salt water the action is so slight as to not produce any appreciable effect. Tests have been made on hard drawn copper wire which had been in service for ten years, and it was found to be apparently as strong as when first put up. As it is exposed to the weather a thin coating of chloride or carbonate forms on the surface of the wire and protects it from further action. Silicon bronze and aluminum bronze possess the same characteristics as copper in regard to deterioration, being even less liable to corrosion. So far as chemical change is concerned, therefore, the life of a copper or bronze wire is practically without limit.

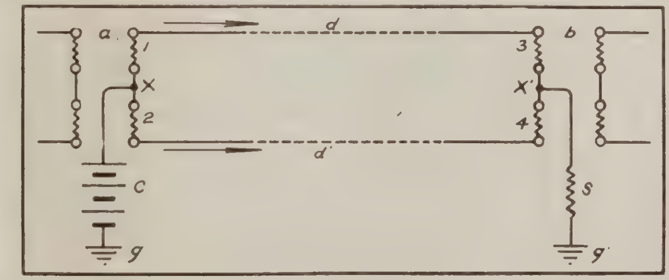


Fig. 208b.

RINGERS FOR FARM LINE.—(210.)

We are going to buy telephones for our bridging farmer's line which will be about 20 miles long and there will be about 15 telephones on it. Would you advise us to get telephones with 1000 or 1600 ohm bells?

N. D. V.

Get those with the 1,600-ohm bells; you will find them well worth the difference.

SPACING OF TRANSPOSITIONS.—(211.)

On a single metallic circuit, 24 to 40 miles in length of No. 10 iron wire, how far apart should the transpositions be?

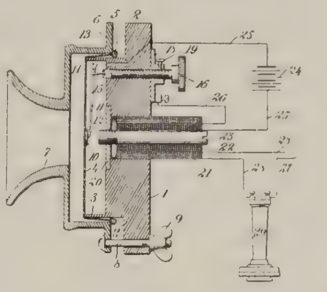
N. O. F.

A standard spacing for transpositions is 1,300 feet. The spacing should depend on conditions, so if it be found after making the transposition as directed, that the line is not as quiet as it should be, more will have to be cut in.

PATENTS ISSUED

TELEPHONE TRANSMITTER.

Dennis O'Brien, of Limestone, N. Y., patents (No. 739,208) an improved telephone transmitter. The object of this invention is to increase the loudness of transmission and improve the purity of articulation. This is shown in the figure. There is a base plate *2*, on which the diaphragm *4*, which is made of rubber or any other flexible material, is clamped. In the center of this diaphragm an iron disc *10* is cemented. This plate carries a very light lever that is pivoted at *13*. This lever passes through the eye of a needle *15*, similar to a sewing needle. Before the instrument is assembled the lever and the needle are oxidized by immersion in acid so that the contact between the lever and the needle will have a high resistance and form a microphonic contact. The needle and lever are included in the circuit of the battery *24*, while in the center of the instrument an induction coil *21* is placed. The induction coil is here placed so that by the mutual action between its core *23* and the armature *10* the pressure at *15* will vary within wider limits and thus make the transmitted sound more powerful.



CORD-TIP.

Wm. Kaisling, of Chicago, Ill., patents (No. 738,545) and assigns to the Kellogg Switchboard & Supply Co. an improved cord-tip. The object of this invention is to provide a simple, convenient, and endurable cord-tip that will secure the end of the weave of a telephone cord to the tips for making electrical connection to apparatus. The essence of this invention is to provide a tooth-shaped plate *8* that is wrapped around the end of the weave upon the cord, as shown in Fig. 4, and then fastened by soldering, driving, or otherwise into the cord-tip *7*, as shown in Fig. 5.

Fig. 1.

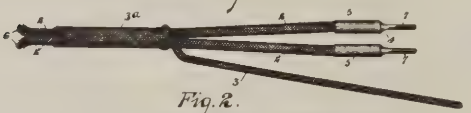


Fig. 3.

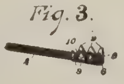


Fig. 2.

Fig. 4.

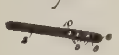
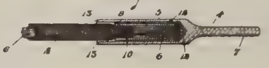
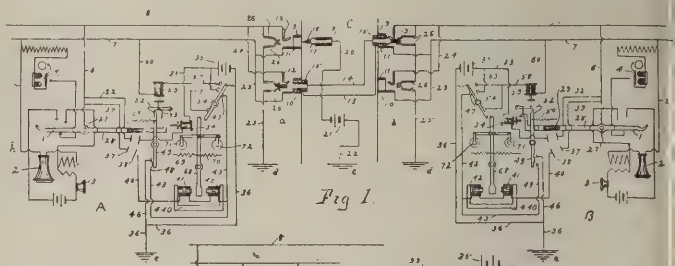


Fig. 5.



TELEPHONE COUNTER.

Albert J. Springborn, of Cleveland, O., patents (No. 740,053) an improved telephone register. The object of this invention is to provide a form of counter or message register which shall be located at the subscriber's sub station, and which shall only operate to record the message when a communication is entirely completed, and by which no register shall be made for busy calls or "don't answers." The circuits from two stations having this invention are shown in Fig. 1, while in Fig. 2 there is a large representation of the circuit of one station. Fig. 3 shows the counter. The circuits of Mr. Springborn's invention are too complicated for full description. The essence of the invention lies in providing each sub station with a polarized relay *41* and *42*. This relay operates a lever *68*, that is connected with the counter. So long as both receivers are on their hooks, the circuit of this relay is open. When one receiver is removed the circuit of relay *41* is closed, and when the receiver of the call party is removed from its hook the local battery from the latter party flows to ground through the wire *36e*, and thence to a similar ground at the station of the calling party. Thence through wire *36* to the polarized relay, which is then excited and actuates the counter. Those who are interested in this invention can trace the circuits from this.



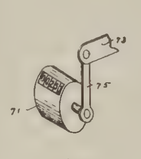


Fig. 3.

Treasurer.

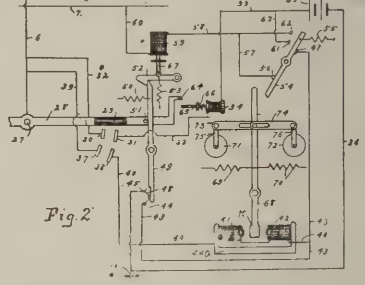


Fig. 2

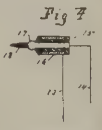


Fig 7

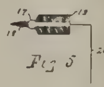


Fig 5

NEW EXCHANGE FOR TRI-STATE.

A BLOCK of ground 300 feet by 300 feet has been purchased by the Tri-State Telephone and Telegraph Company at the corner of Cleveland and St. Anthony avenues, Merriam Park, in St. Paul, Minn., where a temporary building has already been erected for this winter's toll business. Next spring a large handsome fireproof building will be constructed, where the general offices will be located, and through this building will pass all the toll lines to Duluth, Superior, Ashland, La Crosse, Hastings, Austin, Mankato, Sioux Falls, Fergus Falls, Fargo, Grand Forks and other towns in North Dakota. This will give the Twin City Telephone Company long distance connections with all these cities and intermediate points. The Twin City Telephone Company now has 10,116 telephones in daily use. This telephone company being absolutely owned and controlled by St. Paul and Minneapolis citizens, causes it to merit the hearty support of the people of these cities.

DISCUSS THE NEW YORK TOLL LINE SITUATION.

JAMES S. BRAILEY, JR., of Toledo, O., was in conference in Utica, N. Y., recently with Charles H. Poole, T. Harvey Ferris, W. I. Taber, of the Herkimer Independent Telephone Company, Messrs. Brush and Griswold, of the Albany Home Telephone Company, and George R. Fuller, secretary and treasurer of the Rochester Home Telephone Company. The purpose of the conference was to discuss the long distance toll line situation through New York State. There is now in course of construction a long distance line from Albany to Utica and at the conference it was decided to rush the work with all haste.

The Week's Messages.

FINANCIAL

NEWTON, IA.—The Jasper County Telephone Company has increased its capital stock from $100,000 to $150,000. The additional capital stock will be used to extend farmers' lines.

CLARKSVILLE, TENN.—The Clarksville Home Telephone Company has increased its capital stock from $100,000 to $150,000.

CHARLOTTE COURT HOUSE, VA.—The Central Telephone Company of this place has increased its capital stock to $20,000. W. H. Smith is president and W. G. Williams, secretary.

MENDOTA, VA.—The Mendota-Benham's Independent Telephone Company has increased its capital stock from $2,500 to $5,000. The directors are J. C. Pruner, W. W. Sproles, J. S. Fleenor, and others.

FRANCHISES

BURLINGTON, IA.—The Flint River Mutual Telephone Company has asked the board of county supervisors for permission to string wires in the county. The petition was granted.

HOPKINSVILLE, KY.—A majority of the members of the city council united in a request to Mayor Henry to call a special meeting of the council to pass an ordinance authorizing the sale of a franchise for a new telephone system.

NEWBERRY, MICH.—The Munising Telephone and Electric Company, which purchased the contracts with citizens which the Michigan Company had here, has asked the council for a franchcise to construct and operate a plant. There is some disposition manifest among the members of the council to deny the application for a franchise and to construct a municipal plant.

SEWARD, NEB.—The city council has passed an ordinance providing that any telephone company that wishes to do business in this town has the privilege. The Tamora Mutual Company and the Beaver Crossing Telephone Company had petitioned for franchises.

SPOKANE, WASH.—The Inter-State Telephone Company, which operates in Kootenai County, Idaho, has petitioned the Spokane county commissioners for a franchise. The company was represented by its president, M. A. Phelps, and its assistant-secretary, L. B. Cornell.

CALAIS, ME.—President Brehaut of the Forest Telegraph & Telephone Company appeared before the council and asked that the franchise granted the Lakeside Telegraph & Telephone Company be transferred to the Forest Company, which succeeded to the business of the Lakeside.

CLAYTON, N. J.—The Eastern Telephone Company, of Camden, has applied to the borough council for a franchise to erect its poles and operate its line in this borough. The ordinance has passed the first reading.

ELM, N. J.—At the meeting of the borough council the Eastern Telephone Company, of Camden, presented an ordinance asking permission to extend its lines through the town. The matter was referred to the ordinance committee.

FLEMINGTON, N. J.—The Merchants' and Farmers' Telephone and Telegraph Company has been granted a franchise to extend its lines to Flemington.

CLEVELAND, O.—The United States Telephone Company has secured rights of way necessary for a trunk line over the country roads from Dayton to Hamilton.

COVINGTON, O.—The Covington council has received bids for the sale of a twenty-year franchise for a telephone system in Covington. The bids were as follows: George G. Kineon, $1,001; Frank K. Ludlow, $1,000; Horace Durrett, $1,505; Kentucky Telephone Company, $250 and 5 per cent. of the gross receipts.

JOHNSTOWN, PA.—At the next meeting of councils those bodies will be asked to grant a franchise for the City and Suburban Telephone Company to do business in Johnstown.

PITTSBURGH, PA.—The Pittsburgh and Allegheny Telephone Company is said to be making a quiet effort to gain entrance into Sharpsburg after an unsuccessful attempt two years ago. A secret session of the councilmen was held at the home of Councilman M. E. Dethlef, in Sharpsburg. E. H. Bouton, president of the telephone company, was present. An ordinance is said to have been framed, which will be presented at the next meeting of the borough councils.

CHATTANOOGA, TENN.—The franchise for the Hamilton Telephone Company was blocked in the board of aldermen. The special committee failed to make a report, and on motion to take it out of their hands the vote stood 4 and 4.

GREENVILLE, TENN.—The Bristol & Washington County Telephone Company has secured an entrance into Greeneville. From Greeneville they will reach Knoxville by way of Newport and Sevierville. This combination of Independent telephone lines will come in direct competition with the Cumberland Telephone Company for business between the principal towns in East Tennessee, and it is stated that the charges will be greatly reduced.

NASHVILLE, TENN.—When the new city council organizes the bill of the Tennessee Telephone Company, which wishes to establish an Independent telephone system in Nashville, will be introduced. A fifty year franchise is to be asked, giving the city the right to purchase after twenty-five years. Telephones are proposed to be furnished for $3 a month for business houses and $2.50 a month for residence instruments. Thirty free telephones will be given the city and a reduced rate made on additional ones which may be needed.

SPOKANE, WASH.—From St. Maries, Idaho, comes the news that F. W. Haverland, superintendent of the Interstate Telephone Company, has received the deeds conveying the rights to the company to put up its line from Chacolet to Coeur d'Alene across the Coeur d'Alene Indian reservation. The permit is given direct by the government from the office in Washington.

KENOSHA, WIS.—The men who secured control of the franchise of the Independent Telephone Company in this city have announced that application will be made to the common council of the city of Waukegan for a franchise. The application is to be made in the name of the "Citizens Telephone & Telegraph Company of Waukegan" and the enterprise is said to be backed by the Telephone Construction Company of Winthrop Harbor.

PERSONAL

R. B. ABBOTT, formerly of John Roebling's Sons and the AMERICAN TELEPHONE JOURNAL, has accepted a position with The National Wire Corporation as its Chicago representative.

C. W. BARTLETT, the Nebraska representative of the Stromberg-Carlson Telephone Company, of Chicago and Rochester, is now located at 1635 South 22nd St., Lincoln, Nebraska. His previous address was Kansas City, Mo.

F. G. HOWARD has been appointed manager of the Citizens Telephone Company, at Greenville, Mich., to succeed Mr. A. A. Burck, who relieves Mr. Geo. Stratmeyer, of Battle Creek, Mich. Mr. Stratmeyer goes to Grand Rapids as traffic manager.

DAN'L CAMPAN has been appointed manager for the Citizens Telephone Company, at Ionia, Mich.

HARRY S. KRUMM, who has been superintendent for the People's Telephone Company, of Paducah, Ky., since its organization, has gone to Fort Washington, Penn., to assume the position of toll line wire chief for the Consolidated Telephone Company of Philadelphia.

E. B. OVERSHINER, president of The Swedish-American Telephone Company, of Chicago, was in New York last week, completing the organization of the new United States Trust & Savings Bank of Chicago. A number of prominent New Yorkers have subscribed for stock, the most prominent being Mr. Daniel G. Reid, who is to be one of the bank directors. Mr. Reid is probably the best known of Wall Street young financiers. He is a member of the board of directors of the United States Steel Corporation, chairman of the executive committee of the Rock Island system, vice-president of the Liberty National Bank, of New York. Mr. Reid's connection with this new Chicago institution will place it at once in the front ranks of the financial institutions of the West.

THE WEEK'S MESSAGES—Continued

JAMES J. REID, lineman for the Bell Telephone Company, at Erie, Pa., who is attending the international convention of the Brotherhood of Electrical Workers, now in session at Salt Lake City, as a delegate of Erie local, No. 56, has been elected first vice-president of that body.

EDWARD E. WEBSTER has resigned as general manager of the Twin City Telephone Company, of Minneapolis, Minn., to assume the position of general manager of the Independent Telephone Company, of Seattle, Wash. The appreciation in which Mr. Webster is held by the directors of the Twin City Telephone Company is shown by the resolution of the board accepting his resignation, which is as follows:

Whereas, Edward E. Webster has tendered his resignation as secretary, general manager and director of this company, to take effect Oct. 1, 1903, be it

Resolved, That said resignation be, and is hereby accepted; that in accepting the same the board of directors desire to express their appreciation of the untiring energy and zeal which have characterized Mr. Webster's work, to gratefully acknowledge his wise counsel and advice in the deliberations of this body, and gladly to accord to his painstaking efforts a large measure of the success which has attended this company. It is with regret that we accept this resignation and assure Mr. Webster of our cordial good will and best wishes for success in his new field of labor.

B. S. WILLIAMS, who has for some time been the manager of the Central Union Telephone Company, at Mt. Vernon, O., has been relieved by C. C. Chapin, of Washington C. H. Mr. Williams has been transferred to the canvassing department and will have headquarters at Columbus.

COMBINATIONS.

ALBION, N. Y.—The Rural Telephone Company, whose lines started in Lyndonville, in this county, has been reorganized and sold to a new corporation known as the Lake Side Telephone Company, which has a capital stock of $100,000. The company has given a mortgage for $40,000 to the Rochester Trust Company, of Rochester, N. Y., to secure funds to continue the work of construction in this county.

EDON, O.—The Edon plant of the Williams County Toll Line Company has been sold to a new company, known as the Edon Home Telephone Company. E. L. Palmer, of Edon, is president of the new company; Omar L. Spangler, auditor, and E. E. Newman, secretary of the Williams County Toll Line Company, of Bryan, Ohio, are also interested.

MARION, S. D.—Dr. A. E. Hofer, of this place, is negotiating for the purchase from J. A. Steninger, of Parker, of the local telephone system. In the event that Dr. Hofer is unable to purchase this system he will construct a new system.

SHEBOYGAN, WIS.—W. E. Tallmadge, of this city, has purchased the interests of A. B. Ferdinand, president of the Sheboygan County Telephone Company, and also that of the Northwestern Telephone Company.

JACKSONVILLE, FLA.—Walter N. Shine, president and general manager of the Jacksonville Telephone Company, has bought the entire issue of stock of the Independent Telephone Company, of Lake City.

OLLIE, IA.—The citizens have purchased the local telephone exchange from the Southeastern Iowa Telephone Company and have organized it under the name of the Ollie National Telephone Company.

CHERRYVALE, KAN.—Mr. Fred Brown has sold the Cherryvale exchange.

ONAGA, KAS.—Chas. Day and H. H. Benton for the Vermillion Valley Telephone Company, and Judge George Dimm and Manager Spiller for the Independent Telephone Company, have arranged for a consolidation of their inaerests, by which the Independent company takes over all the business.

HOBART, N. Y.—Hugh K. Rose, owner of the Farmers' Telephone line, has purchased from D. C. Sharpe the Stamford Delhi Telephone and Telegraph line, and the two systems will be merged. Mr. Rose will reconstruct the purchased line. The Farmers' line will also be improved and a metallic put in from Grand Gorge to Oneonta.

SAN RAFAEL, CAL.—Marin county is to have a new telephone system in the near future, a rival of the Pacific States Telephone and Telegraph Company, and will be supplied subscribers at a less rate. A corporation has already been organized under the title of "The Marin County Mutual Telephone Company," and a capital stock of $100,000 has been subscribed. The promoters of the scheme are desirous of temporarily keeping their names in the background, and have selected Frederick J. Travis, an electrical contractor of San Francisco, to represent them and to superintend the construction work. The headquarters of the new company will be at San Rafael, and the service is to be restricted to the county limits. Sausalito, Tiburon, Belvedere and all the towns to the north and south of the main office will be included in its plans.

KITTANNING, PA.—The Cowanshannock Independent Telephone Company, of Kittanning, is making connections with the Indiana Telephone Company for direct communications between the two towns. The Kittanning company's lines now run to Whitesburg; from there a line will be built to Elderton. At Elderton connections will be made with a private line of Postmaster J. R. Dunmire, running to Shelocta, to which the Indiana company's lines run.

PITTSBURGH, PA.—The Pittsburgh & Allegheny Telephone Company has purchased a lot 33x60 feet, for $7,000, in McKeesport. The company will erect a new exchange on the site at once. The underground system of the company is down on more than five miles of streets. Notices posted at McKeesport state that a service between McKeesport and Pittsburgh will be in operation in 90 days.

WELLSBURG, PA.—The Cumberland Basin Coal Company, of Barrellsville, Md., and Wellersburg, Pa., is building a ten station, four mile telephone line to connect all of their workings with office at Barrellsville.

ST. GEORGES, S. C.—An Independent Telephone Company has opened up for business with sixty subscribers—or twenty-five more than they expected to start. W. S. Utsey is manager.

ABERDEEN, S. D.—At the annual meeting of the Dakota Central Telephone Company the old officers were re-elected. The by-laws were amended so as to provide for an advisory board of four who shall act with the directors. The company is planning on many extensions and improvements.

BRISTOL, TENN.—Manager Albert Parlett, of the Bristol Telephone Company, has decided to secure more convenient rooms for the local exchange.

PARIS, TEXAS.—The directors of the Citizens' Telephone Company, of Paris have let a contract for a long distance line from Clarksville to Honeygrove, a distance of fifty-five miles. Another contract was also taken for a line running from Honeygrove to Sherman, a distance of fifty miles, the last named line to be constructed after the completion of the first.

FARMVILLE, VA.—Work has commenced on the telephone system to be built in Prince Edward and Cumberland counties by the Southside Telephone Company, recently organized, in Farmville. The main line will be built to Bethlehem Church, in Prince Edward, connecting there with the Pamplin City and Charlotte Courthouse system, and in Cumberland county, the line will connect at Cumberland Courthouse, with a line to Richmond. The officers are: Dr. Peter Winston, president; J. D. Eggleston, vice-president and general manager; E. W. Venable, secretary, and Kenner Crawley, who is chairmon of the construction forces.

CHELAN, WASH.—J. B. Waters, of Spokane, is in this city to establish a new telephone system, styled the Lake Chelan Telephone & Telegraph Company. This company asks for a guarantee of fifty subscribers and a franchise from the city, promising to start work immediately. The first day the company's petition was circulated for telephones thirty-four names were received. The company will run its line to Wenatchee and also up the lake to Stehekin and other resorts on the lake.

PARKERSBURG, W. VA.—The West Virginia Western Telephone Company will overhaul and repair its lines through the counties of Woods, Pleasants, Tyler, Ritchie and Doddridge. This company has not less than 1,300 miles of wire in these counties, and it is continually adding new lines.

SPARTA, WIS.—D. S. Schroeder, of Fountain City, is in town soliciting for another telephone system. He reports that already some eighty subscribers have been secured, with promise of more.

ELECTIONS

HYANNIS, MASS.—The Cape Cod Telephone Company has elected the following officers: F. P. Gross, president; A. W. Guyer, vice president; A. G. Guyer, clerk and treasurer.

GAINESVILLE, TEX.—The People's Home Telephone Company has elected these officers: William Rowland, of Chicago, Ill., president; F. E. McElroy, of Fort Worth, vice-president; C. B. Luck, of Gainesville, secretary; and W. H. Jones, of Chicago, treasurer.

UNDERGROUND

KANSAS CITY, MO.—G. E. Payne, of St. Louis, superintendent of the Postal Telegraph Cable Company, is consulting with City Councilman Ingraham and B. C. Haldeman, city electrician, relative to putting the company's wires underground.

ATLANTIC CITY, N. J.—The Bell Telephone Company contemplates putting all its wires in this city underground. The plans and specifications are on file in the office of the International Telephone Company in Trenton, N. J.

SOUTH BETHLEHEM, PA.—It has been practically decided by the Pennsylvania Telephone Company to place all its wires here underground.

SHELOCTA, PA.—A company has been formed and is constructing a telephone line from here to Jacksonville. The officers of the company are: John Craig, president; Thomas Anderson, secretary; William Craig, treasurer, and Thomas E. Wachob, vice-president.

ROANOKE, VA.—Addison Maupin, special agent of the Bell Telephone Company, is in the city with a view of obtaining permission to put the wires

THE WEEK'S MESSAGES—Concluded.

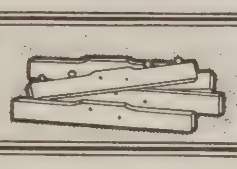
underground in the business section of the city at an estimated cost of $100,000.

LA CROSSE, WIS.—The executive committee of the La Crosse manufacturers' and jobbers' union has decided to accept the proposition of the Tri-City Telephone and Telegraph Company, of Minneapolis, which proposed to construct a long distance line from Minneapolis to Austin by way of La Crosse. The union will purchase $20,000 worth of the stock in the company as a bonus.

MISCELLANEOUS

CINCINNATI, O.—Judge Nippart, of the Probate Court, has handed down a decision holding that the Cincinnati Telephone Company has proven its croporate existence, which was denied by the City and Suburban Telephone and Telegraph Association. Following the decision, Powell Crossley, promoter of the Cincinnati Company, introduced evidence that the committee of telephone, telegraphs and conduits of the city council had not acted on the company's request for a hearing on the franchise.

New Construction in the Field



GRAFTON, NEB.—The Fillmore County Independent Telephone Company have completed the installation of their local village exchange here. Walter Burke has charge of central.

MEREDITH, N. H.—An attempt is being made to construct a telephone line from here to Meredith Center. Joseph F. Smith is one of the leaders in the movement.

NEW IPSWICH, N. H.—The New Ipswich Telephone Company will construct a line from the center to Smithville.

LEBANON, N. J.—The Lebanon Telephone Company will construct a line to North Branch. The company recently erected a line part way to that town.

ALBANY, N. Y.—Howard Hendrickson, president of the Albany Home Telephone Company, makes the announcement that the company will increase its capacity for 1,000 more subscribers. The company is pushing new extensions in all directions.

SILVER CITY, N. M.—The Grand County Telephone Company has decided to extend its line from Silver City into the camp of Gold Gulch.

DARIEN, N. Y.—The Darien Telephone Company will construct a line from Darien Center to Alexander.

GRANVILLE, N. Y.—The Granville Telephone Company will construct a line to White Creek.

LOWVILLE, N. Y.—The Black River Telephone Company has secured a contract from the War Department to equip Madison Barracks at Sacketts Harbor with a telephone plant.

BUXTON, N. D.—The Buxton Telephone Company is making arrangements to extend a line to Portland and install a central office.

AKRON, O.—Work has been started by the recently incorporated Summit Rural Telephone Company on building toll stations at Montrose, Ghent and Hammond's Corners. Other toll stations will be built soon, and the lines will have connection with the Akron Peoples' Telephone Company and the long distance lines.

CINCINNATI, O.—The Cincinnati Telephone Company has let a contract for the erection of a new exchange to Griffith & Sons.

JAMESTOWN, O.—The Citizens' Telephone Company is constructing a line to Rosemoor. Another line will be extended to Pleasant View.

NORTH EAST, PA.—The North East Mutual Telephone Company is buliding a line to Greenfield. It expects to have 300 instruments in service here this winter, and now has thirteen in South Ripley.

WILKESBARRE, PA.—The People's Telephone Company is preparing to extend its lines to other towns and improve the local and suburban service. The company recently voluntarily increased the wages of its operating force.

ST. GEORGE, S. C.—The St. George Telephone Company will extend its line to Harleyville, Grover and other towns.

CLARKSVILLE, TENN.—The Home Telephone Company has opened an exchange in Dover, and long distance connection can now be had at that point over this company's lines.

FLATONIA, TEX.—H. R. Rhodes and J. E. Rhodes are constructing a new telephone line between Elm Grove and this town.

SOUTH RYE GATE, VT.—The People's Telephone Line will be extended from South Rye Gate to Newbury. An effort is being made to have the lines extend to East Rye Gate and to Groton.

LOUISA, VA.—The Louisa Telephone Company is repairing its lines between Louisa and Cuckoo, Va., by resetting a number of poles, and is adding several new lines.

DAVENPORT, WASH.—John Hansen, proprietor of the farmers' barb wire telephone system, is reconstructing his system by erecting poles to take the place of the fences, which did not work well.

UNION, W. VA.—The Greenbrier & Organ Cave Telephone Company will hold a meeting here on Saturday to consider the matter of improving the service.

DORCHESTER, ILL.—The West Dorchester Independent Telephone Company, the first rural company to be organized in this section, is constructing a line west of town. Another line is being figured on to run to Brushy Mound.

ST. HELENS, ORE.—The city council has decided to aid the extension of the line of the St. Helens and Yankton telephone line from Valley to Pittsburg, a distance of about ten miles, by popular subscriptions, the members of the council themselves helping along the work.

JOANNA, PA.—The Conestoga Valley Telephone Company will construct a line from here to Birdsboro.

KNOXDALE, PA.—J. F. Miller, of Knoxdale, has been authorized by the Cool Spring, Knoxdale and Reynoldsville Division and the Farmers' Telephone Company, to superintend the construction of a line from Knoxdale by way of Fuller, Emerickville to Reynoldsville.

WATERTOWN, S. D.—The Dakota Central Telephone Company has decided to enlarge and improve its local plant, as the number of subscribers has increased to such an extent that it is impossible to take any new ones.

GROTON, VT.—Hatch and Blodgett are planning to extend their telephone line to South Peacham. The line will go through North Rye Gate to Mosquitoville.

TRADE NOTES

W. H. Crumb, & Company, Engineers and Contractors, Chicago, Ill., have been given the contract for the construction of the entire plant of The Southern Telephone & Telegraph Company, at Hot Springs, Ark.

The Stromberg-Carlson Telephone Manufacturing Company, of Chicago and Rochester, announces that Mr. C. W. Bartlett, its Nebraska representative, has changed his address from Kansas City, Mo., to 1635 South 22nd Street, Lincoln, Nebraska.

Jones & Winter, of Chicago, have the contract for installing the exchanges of the People's Home Telephone Co., at Gainesville and Denton, Texas, as well as for the construction of long distance lines connecting these cities with Fort Worth. Mr. Chas. B. Luck represents the company as superintendent on this work.

The West Disinfecting Company, of 29 East 59th Street, New York City, manufacturers of disinfectants and disinfecting appliances, announces that it has secured from the Telephonine Company of America, 19 Union Square, New York City, the exclusive sale of its goods in the United States and Canada.

The S. H. Couch Company, of 156 Pearl Street, Boston, Mass., has issued a bulletin—No. 7—descriptive of its "Justrite" Fork Switch, also its switchboard plug, jack and the new "Workrite" desk push button which is said to be a winner. This company issues various bulletins covering all the complete line of exchange apparatus that it manufactures, and will be pleased to mail copies to any one interested.

The National Wire Corporation, of New Haven, Conn., has secured Mr. R. B. Abbott, formerly of John Roebling's Sons, to represent it in Chicago. The company's offices will be at 715 The Rookery. The Independent Telephone Company has an instrument at the office, the number of which is 3,509. It is probable that, for the first time, the number of a Chicago Independent telephone was printed on the stationery of this company.

TRADE NOTES—Concluded

The F. Bissell Company, of Toledo, Ohio, dealers in electrical supplies and machinery, has sent us a private mail card which has on it brief descriptions, cuts, and prices of some of the telephone specialties that it manufactures. The card is well worth looking at and contains much of interest to the telephone operator.

The North Electric Company, of Cleveland, Ohio, has issued a booklet, "The Rural Telephone," which from a viewpoint of appearance surpasses anything heretofore issued in the telephone trade. The cover is of a heavy dark gray, matt surfaced cardboard, and on it to one side of the center is affixed a fine half-tone picture of a country road, which is printed on a long, graceful, white coated paper. Along the side of the road and rounding a turn in the distance, runs a telephone line, which gives just enough of the technical to it to draw the telephone man's attention. The result of framing the half-tone in the dark gray of the cover is very effective. The book is the product of F. F. Sapp, sales manager for the company. On the inside no space is given to prices or descriptions of apparatus, although it is very well illustrated. All is taken up by a little treatise on the organization, construction, and maintenance of a Rural Telephone System and the selection of the proper apparatus for it. The construction of a rural line is dwelt upon at some length, and estimates for different classes of construction are given. The printing on the inside is with a rich brown ink. The book is well worth having.

The Vought Berger Company, of La Crosse, Wis., has issued a pamphlet describing its No. 45 telephone. The instrument has a dignified, rich appearance, and resembles closely the common battery type in use at present. The swing-down shelf on which the ringers are arranged makes them readily accessible for inspection and adjustment. When the instrument is open, all working parts can be inspected both from the front and the top.

The batteries are placed in a compartment in the lower portion of the cabinet, and are covered by a sliding panel so they can be reached without opening balance of telephone. When the telephone is closed, the shelf is screwed firmly to backboard, obviating the necessity of a lock, and, at the same time, effectually protecting the instrument from meddlers. The backboard is kept from coming into close contact with the wall, by small wooden bushings, which are inserted in back at the points where the wall screws go through. It is but a simple matter to change this telephone from series magneto to bridging, or vice versa, as cabinet will fit either generator. If a rapidly growing exchange contemplates changing over to central energy in the future, these telephones can readily be adapted to the new system. No sacrifice sale of magneto telephones will be necessary. The standard & B. equipment is furnished with the instrument. This telephone should satisfy a growing demand and doubtless will have a large sale.

The Stromberg-Carlson Telephone Manufacturing Company, of Chicago, Ill., and Rochester, N. Y., has issued its bulletins Nos. 6 and No. 7. No. 6 describes Generator Call Switchboards and No. 7 Generator Call Switchboard Parts. These bulletins undoubtedly cover more fully the apparatus of which they treat than any which have heretofore been published in this country. The loose leaf idea which this company applies to its catalogues is used. Each sheet is punched with two holes, through which a fastener may be placed. In this way it is possible to always keep the catalogue up to date. As the company manufactures new apparatus, they issue a sheet or sheets, which describe it, and these may be bound in the came cover with any other of their literature.

In bulletin No. 6, which is descriptive of Generator Call Switchboards, half-tone inllustrations are shown of each type of cabinet, and on the backs of the same sheet is a detail dimensioned drawing of the cabinet. This feature will appeal to any practical telephone man. To aid prospective buyers in the selection of an equipment there has been compiled a number of standard equipments for the different boards, which experience has shown to be the ones most in demand. A summary sheet is also included, which will assist the purchaser in determining what apparatus he probably wants, and it also enables the company to give a price with much more dispatch. In the front of the book the methods employed in the manufacture of many portions of the switchboard components are described.

Generator Call Switchboard Parts, in Bulletin No. 7, are illustrated, described and the net prices given on them. This innovation is a good one. A novel method has been employed in coding the different keys and jacks. Instead of trying to describe the springs and functions of each of the many jacks and keys, a little diagram is given of each one, so that by merely glancing at the drawing the telephone man is able to understand more about the apparatus than if he read half a page of description. These bulletins will be sent to anyone interested. When writing, ask for bulletins 6B and 7B.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

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POSITION.—Wanted position as Superintendent or Manager of telephone company. Have had 9 years' experience in building telephone exchanges, operating and maintaining. Have just finished 200 miles of toll line and 5 exchanges. Am Superintendent of Construction for Bell Telephone Company at present; 30 years of age, and strictly temperate. Can furnish best of references. Address, P. O. Box 52, Malden, Mo. 94.

ARE YOU AMBITIOUS? Would you like to make more money than you do at present? We can tell you an easy way to do so. Write at once for full particulars. Address Box 93, care of The American Telephone Journal, 116 Nassau Street, New York City.

TO LEASE EXCHANGE.—Wanted to lease, Telephone Exchange by experienced man. Will correspond with parties having exchange with or without toll lines, with view of buying. West or Southwest preferred. Address, Box 92, The American Telephone Journal, 116 Nassau Street, New York City.

TELEPHONE ENGINEER.—The First German Telephone Manufactory wants for the management of its construction departments for multiplying an experienced Telephone Engineer. Men, well experienced, especially with the Modern Common Battery System and who have been active for some time in large plants of this specialty, are requested to send detailed applications to I. U., 5764, care of RUDOLF MOSSE, Berlin, S. W., GERMANY. Knowledge of the German languagy necessary. 91.

ACCOUNTANT.—Wanted, first-class acountant and bookkeeper to take charge of a large Independent Telephone Company's office and books in Pennsylvania. Address, Box 88, The American Telephone Journal, 116 Nassau St., New York City.

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau street, New York City.

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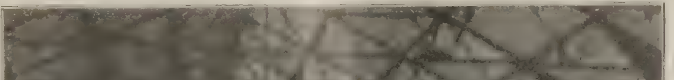
VOLUME VIII SATURDAY, OCTOBER 17, 1903 NUMBER 16

THE TELEPHONE IN A POWER PLANT

By Arthur B. Weeks, *in The Street Railway Review.*

DURING times of emergency or during unusually busy periods the extent of the demands made upon the telephone operator at a great power plant is seldom realized. The position is an important and responsible one, since the operator must not only be quick and accurate, but must in a measure anticipate the messages which the electrician in charge would deliver, thereby greatly facilitating changes in switching in various stations, and frequently preventing disaster. For there are times when the entire attention of the electrician must be centered on his switching. At times, also, on such occasions, the night watchman and assistant electrician come to him for instructions he may wish to give to the telephone operator. One of the illustrations shows a night scene at the telephone exchange of the Niagara Falls Power Co. There the operator is almost always busy. At the right is the night lineman, whose duty it is to patrol the transmission lines at night in cases of necessity, looking out for leaky insulators, burnt poles, or more severe troubles after a short circuit. This telephone exchange is in direct communication with the main switchboards, all of the local sub-stations and the transformer stations of all tenants, as well as with all stations along the transmission lines, such as La Salle, Tonawanda, Lockport, and a number of sub-stations in Buffalo. Everything here runs smoothly as long as there is no trouble; but as soon as the electrician foresees a possible complication, he puts the operator on his guard, and in times of thunder storms or a heavy run of grass or ice in the river, sees that regular communication is kept up every half-hour between the stations liable to be called upon to reduce load, should such necessity arise. Some electricians prefer to do their own telephoning, but it saves time to leave this to the operator when he is thoroughly reliable, giving the electrician opportunity to devote his attention at once to all the details of the entire plant.



Interior of the Power House at Niagara Falls. Switchboard No. 2 in Foreground. Switchboard No. 1 in the Distance.

Supposing a severe east wind blows up during the grass season; the governor foreman may have dozens of extra men out raking grass, while a heavy rain is pelting down, and the steam crane constantly hauling away car loads of grass. And, in spite of all efforts, the grass may be getting the best of them, with the result that the water is greatly reduced at one or more penstocks. The load must be at once reduced by an amount determined by the judgment of the electrician. He telephones the operator and advises him to call a certain power tenant and instruct him to take off a stated amount of load at once. The request complied with, the attendant telephones the power house exchange to that effect, and the operator in turn notifies the electrician through the electrician, who keeps a constant watch on the output of the 50,000-h. p. plant, is aware of the change before the message has been received. The only way to operate a switchboard successfully is to keep thus in touch with the whole plant. The storm may increase in severity and require more load reduction; perhaps even a third or fourth reduction; and each time it must be so timed that there will be no burned-out bearings. The load is not all taken off from one concern, but the reduction is divided among several. This is one of the ticklish things to be encountered, and at times the electrician must call upon his superior officers beforehand to learn where the reduction can best be made. He would be very neglectful, to say the least, if this information were ascertained too late to save trouble, for difficulties of another sort would await him if he failed in this. "He must predetermine his exact course in all cases of trouble."

Quickness is essential in all concerned; for when a turbine governor shows that it is taking on excessive "rack" and the generator load is diminishing at the same time, the corresponding dynamo must be shut down at once. Different methods of operation prevail on each shift, all acting according to their best judgment; for there can be no fixed rules for emergencies like these. Indeed, though the Power company has laid down rules to cover every point possible, for the guidance of all departments, it stops short here. Each electrician in charge must run his shift according to his best judgment in times of emergency, and must frequently decide almost instantaneously. Here the telephone operator comes to the assistance of the electrician again. It may be there has been a great run of ice, and the local load has been reduced; and Buffalo, which is last to be reduced, gets a hurried call to throw off load; the blast from a semaphore, also, which means the immediate shut-down of the dynamo corresponding, calls for another immediate reduction of load. If it is impossible to get the parties in time to accomplish this before a bearing becomes dangerously hot, as indicated by the thermometers in the oil of the bearings, the electrician must resort to the last means at his disposal—throwing the emergency switch, which opens all the fields of the dynamos involved.

The Electrician in Charge of the Power House on Duty.

There is a busy time now for the telephone operator. Besides the numerous inquiries as to "What's the matter?" "How long will the power be off?" "Any damage done?" etc., all of which must be promptly and respectfully answered, he must be ready to carry out at once the electrician's orders. The method of starting depends upon the nature of a shut-down. The long-distance lines always have preference. The electrician will usually close a dynamo A. C. switch and put on the field in starting up, no current being on the A. C. bus-bars. He will then synchronize the next generator and telephone to Buffalo and Tonawanda to put on a certain load, according to the conditions. Before they can get on their load, he will have another dynamo in operation, and all safe for the time being. So many conditions exist which are liable to change this plan that no set regulations can apply.

The Night Operator and Night Lineman on Duty at the Switchboard.

When a shut-down is due to a short-circuit on local or long-distance lines, the method of starting is the same; and the order of giving current to the numerous tenants is usually the same. Ordinarily, only one party is affected by a short circuit on the local service, and that feeder is left open until the repair men report all right. A short circuit on the transmission lines, however, usually affects the whole system, though occasionally a Lockport breaker may drop out without shutting down everything. Should there be trouble any time on a certain line, that line is cut out, and the remaining lines carry the load. There must be great accuracy in telephoning at these times, for the electrician must give instructions to Tonawanda to make certain changes, and different instructions must go to the terminal house at Buffalo. He also instructs his assistant at the powerhouse what changes are to be made in switching in the transformer room across the bridge. Besides this, a return call must be received from each party interested. A short circuit is manifested in differing degrees of severity. Should it hang on, and the tenants' breakers not open after the lapse of a few seconds, the electrician may deem it best to use the emergency switch. When this occurs on the local service, the telephone operator, as well as everybody else on the shift, has a busy time of it. Before starting, in order to avoid accident, the assistant electrician must examine every switch, to ascertain whether they are all open. The electrician can see none of the switches he opens and closes, having only short levers to throw, which pneumatically control the main switches.

When one dynamo is on and the most important feeder is also closed, the tenant at this plant immediately proceeds to start his machines which supply direct current for electrolytic purposes. Another dynamo is put on, and, as generators are started and feeders closed, load is given out in a certain order until all are served. This is an exciting period, and the work is carried on swiftly with rarely an accident in any way. Synchronizing requires special attention, and if the governor attendant is alert, he can generally assist in shortening this period, which varies from one-half minute to one-half hour. Some men are over-careful and timid, whereas confidence should be the watchword of every electrician in this position. It is not suited to a timid person. He must never lose his nerve. If he does, he had better give up at once and save his reputation, as well as thousands of dollars to the company. If one mistake is made, another is liable to follow at once; for, always fearing trouble, one is almost certain to do the wrong thing when it comes.

To intelligently carry on his work, the telephone operator must know the amounts of power used by the various tenants. These have increased rapidly. Some concerns have only to trip a circuit-breaker, and all is clear. Some changes are necessary at other plants before it is safe to open breakers under load, as they hold the arc, which would burn down an entire panel in less time than it takes to tell. A remarkable occurrence at the Niagara Falls powerhouse was the actual warping of a marble barrier between two circuit breakers at 2,300-volt mains. Barriers under similar circumstances had been blown to atoms. This description of the work of electrician and telephone operator in emergencies will serve to show the importance of these positions, and the qualities required for their successful filling in the powerhouse of a large electric plant. It is hard to see how such a plant could be operated without the aid of telephone system.

WESTERN UNION WINS SUIT AGAINST BELL

A DECISION has been handed down in Boston, Mass., by the United States Circuit Court of Appeals, in favor of the plaintiffs in the case of the Western Union Telegraph Company, et al., against the American Bell Telephone Company. The decision is one of the most important ever made in the state of Massachusetts. The suit was for an accounting of certain shares of stock of companies licensed by the Bell Company, under the contract of Nov. 10, 1879. Millions are at stake. The Appellate Court reversed the decree of the Circuit Court which overruled exceptions to the master's report and confirmed that report, which held that the plaintiffs could not recover. Now the Court of Appeals decides that the plaintiffs are entitled to an accounting.

The contract related to the leasing of telephone instruments under exclusive licenses for specific territories for compensation in the form of rentals. In substance, the contract gave the Bell company the exclusive license for the term of the Western Union patents or for any extension. The Western Union also agreed to acquire certain other patents, applications for which were pending, and to license the Bell company under them. It also stipulated that if it should thereafter acquire any telephone patents the Bell company should have the right to use them. It agreed to withdraw from the manufacture, rental and use of telephones itself, gave the field to the Bell company and to transfer telephone exchanges it had established. It is said that the Bell company was to give the Western Union 20 per cent. of the rentals or realties.

Shortly after making the contract the Bell company changed its course of business and began to give licenses to use telephones for rentals and for stock. The Western Union contended that the stock received was as much rental as the money rental. By this process the Bell obtained about $18,000,000 in stocks at their par value, for which it gave nothing but exclusive licenses to use and rent telephones. The contention the company made was that it was entitled to such stock, because by the course of business before the contract was made the value of the patents on these telephone instruments had been divided into a value for the instruments' use, which would practically be no value at all, as it is of no use for a man to have a telephone instrument unless he has a right to connect it in an exchange, and that the Bell company contracted with the Western Union only with respect to the first value.

Both values, the Western Union asserted, were under the same contracts, and it was entitled to share the proceeds of the one as well as the other. The Western Union sought to secure one-fifth of the amount received by the Bell company in stock. The Court of Appeals says that it is entitled to an accounting in respect to that stock. The officials and stockholders of the Western Union Telegraph Company are gratified at the decision. This decision marks the end of a legal contest which has been in and out of the courts for almost twenty years. The suit was brought originally by the Western Union Telegraph Company in 1884 to recover 20 per cent. of certain telephone profits of companies licensed by the Bell Telephone Company which had taken over certain telephone patents of the Western Union under a contract made in November, 1879, whereby in exchange for those patents the Western Union was to receive the profits above stated. The exact amount at stake will not be known until an accounting is made to the court. Western Union authorities place it between $2,000,000 and $5,000,000.

President Clowry of Western Union says: "We are much gratified at this decision in our favor. The amount in question runs into the millions. We cannot tell the exact amount until an accounting is rendered." J. H. Benton, Jr., counsel for the Western Union Telegraph Company, says that the decision of the United States Circuit Court of Appeals in the telephone royalty case just decided, is final, and cannot be taken to the United States Supreme Court.

IMPEDANCE AND RETARDATION

By Arthur Vaughan Abbott.

IN telephony one is constantly hearing about impedance in circuits, and the use of retardation coils. In a general way everyone understands that the words *"Impedance"* and *"Retardation"* convey the idea of obstruction and delay, but the application of these terms to electrical apparatus often fails to convey a clear conception of what happens, or at least what electricians believe is taking place. Before, therefore, we can proceed with a desciption of the various methods to measure impedance, and determine retardation, it is necessary to devote such consideration to these terms as will enable a clear understanding of their true meaning, to be formed.

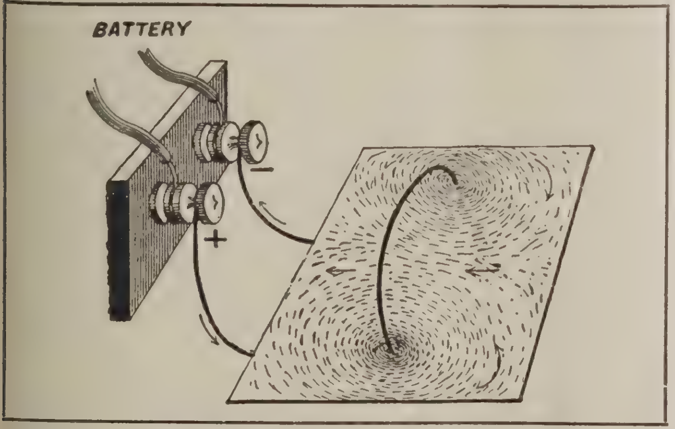


Fig. 1. Lines of Force Surrounding a Wire Carrying Current.

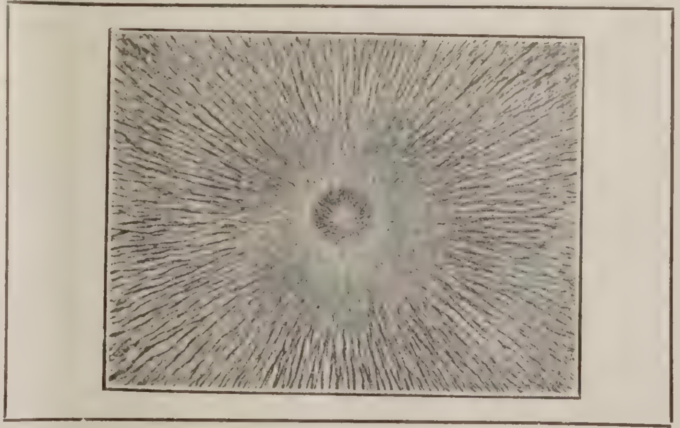


Fig. 2. The Magnetic Field.

In an earlier paper it was shown that all substances to a greater or less degree oppose the passage of electricity. To this property the term "resistance" is given and it was shown that power in the form of electromotive force was needed to drive electricity against resistance. Resistance operates in some mysterious, and as yet unknown fashion, to change a portion of the electricity which a conductor conveys into heat. This heat manifests itself first by raising the temperature of the conductor above that of the surrounding air; finally it is radiated away and usually, so far as the useful operation of the circuit as conveyor of electricity is concerned, wasted and lost. In some cases, the elevation of temperature due to resistance is turned to a useful account. Thus in the common fuse it is employed to protect the circuit against an overload. A short piece of a very easily fusible substance is inserted, which in case too much current traverses the conductor will melt under the increase in temperature, thereby produced, and by rupturing the circuit, prevent a further operation, which, if continued, might become dangerous. In the familiar heat coil a other instance may be cited. A piece of fine wire forming a short portion of the circuit is coiled about a pin to which it is secured by readily fusible folder. If too much current flows the wire becomes heated, the solder melts, the pin is released and falling onto a contact opens the circuit on switchboard side, and grounds outside line.

There are, however, other phenomena manifested when a curcent traverses a conductor, which in some respects are more mysterious, more wonderful and more important than the exhibition of heat thus described. Experience shows that the space which surrounds every conductor, through which a current is passing becomes magnetized, or appears to possess the same properties that are exhibited by an ordinary magnet.

It is easy to demonstrate this—take a piece of cardboard and in the center of it punch a small hole, large enough to admit a No. 10 wire. Insert a wire in the cardboard which should be held flat, and on the pasteboard sprinkle some iron filings. As the filings fall it will be seen that they lie with no attempt at any definite arrangement. If now the ends of the wire be connected to a source of electricity, say the poles of a storage battery or a lamp socket of an Edison circuit, with a resistance in series, and then if the cardboard be gently tapped with the finger, or the end of a pencil, the iron filings will arrange themselves in concentric circular lines surrounding the conductor, see Fig. 1. If the same experiment be repeated by substituting the end of a magnetized bar for the conductor carrying the current, it will be found that the filings arrange themselves in a similar manner—Fig. 2.

From these two experiments we prove the similarity of the properties of the space surrounding the wire carrying a current to those which surround the magnetized bar. There is, however, this difference; the bar retains its magnetism, while the magnetic field created by the wire vanishes as soon as the current is interrupted. This is easily proved by disconnecting the wire from the battery, and again tapping the pasteboard when it will be found that the filings no longer retain their circular arrangement, but disport themselves without regularity, over the surface of the pasteboard. Inasmuch as one never gets something for nothing, some of the energy of electricity which was passing through the wire must have been expended in producing the magnetic field. Energy thus used is not lost in the same sense as that employed in producing heat, for experiment shows that when the circuit is broken, the energy which has been *absorbed* in the magnetic field is in some mysterious manner *returned* to the wire, or in other words it is simply for the time being loaned to the space which surrounds the conductor.

If we experiment still further with the pasteboard and the iron filings, we shall find that when a given current flows through the wire, the filings are affected for a certain distance around the conductor. If the current is increased a greater area of filings is influenced, while if the current is decreased a corresponding diminution in the area will be noticed, but so long as the current is steady the effect on the filings appears to be steady. From this lesson we deduce the idea that every variation in the electrical state of a conductor produces a corresponding variation in the space that surrounds it.

Let us consider in the light of this principle what happens to a conductor when it is first attached to a battery. Evidently it is impossible for the electricity to manifest itself absolutely instantaneously over the whole of the conductor, for during the first almost inconceivably minute fraction of time, the energy developed by the battery must be occupying itself in creating the magnetic field which surrounds the conductor, and again if he flow of electricity be increased, the current does not instantaneously increase throughout the entire length of the conductor, because, for the first fraction of the second the electricity is occupied in *extending* the magnetic field. On the other hand, if the conductor joining any source of electricity be suddenly ruptured, the current does not at that absolute instant stop, but on the contrary, as soon as the flow begins to decrease, the surrounding magnetic field *returns* a portion of its energy *to* the conductor, which tends to continue the current after actual physical rupture has taken place. It is easy to prove this by a familiar experiment. Suppose the poles of a battery be joined by a wire, one can readily observe that when the circuit is first completed there is a very minute spark, and when the circuit is broken the spark is much larger and longer. The spark when the circuit is joined is very small, because a large part of the electricity which starts to flow is employed in making the magnetic field, while the spark is large and heavy when the current is ruptured, because then the energy stored in the magnetic field is liberated and used in continuing the current. This ability of a circuit to magnetize the space that surrounds it is termed *Inductance.*

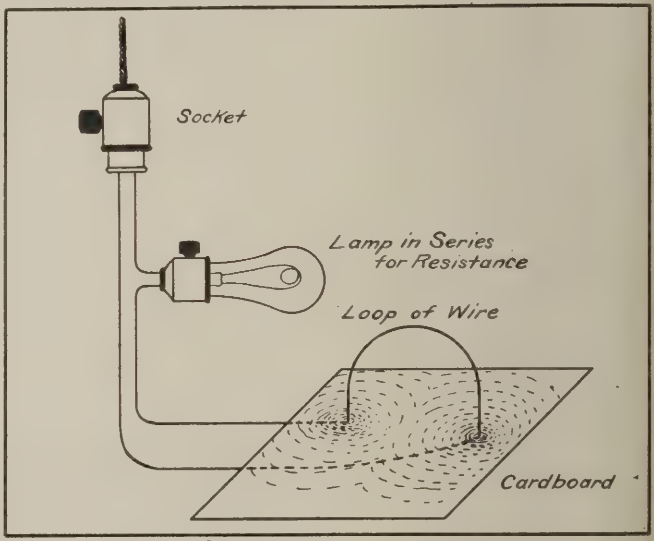


Fig. 3. Using Edison Circuit to Show Magnetic Field.

To look at the matter from another point of view, it is convenient to return to the hydraulic analogy used in one of the earlier papers. Suppose we imagine the battery or other source of electricity to resemble a water tank, from which electricity flows like a lquid, and suppose we conceive that a pipe leads from this tank, made of some spongy material, like cork, capable of absorbing a large amount of fluid. If the water be turned on, the first operation is that of filling the pipe, and if its walls are thick and porous, a large amount of water may soak into the actual substance of the pipe. Now if the water be turned off, what has been absorbed by the pipe, will flow out. In such a contrivance, it will take the water much longer to reach the distant end than if the pipe were constructed of a non-spongy material, and further, a quantity of water will, for the time being, be retained by the walls of the pipe. So the operation of such a pipe is to delay the flow of the water in the first place, and to continue the current in the second place. Now, let us suppose the tank supplied with a stop cock, which can be rapidly opened and shut, also that it takes 10 seconds for the water to fill the pipe and reach the distant end. If the valve is opened for 5 seconds only, and then closed, it is evident that no water would reach the distant end, because all which would run out of the tank would be absorbed in the porous walls of the pipe.

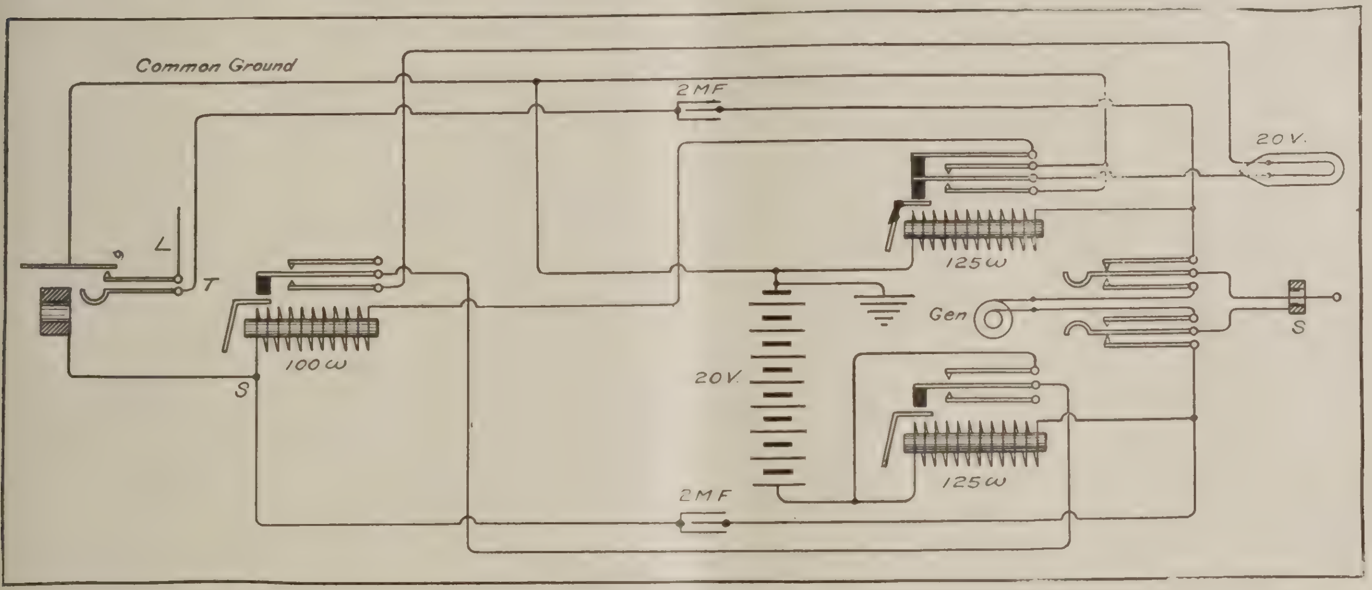
Let us see whether this analogy will not throw some light on the effect which inductance produces upon an electric circuit. The instant that the conductor is closed, electricity commences to flow, but the first portions are used in creating the magnetic field; when formed, no further change takes place, unless the electromotive force, and consequently the current, varies, then with every increase of current the magnetic field abstracts energy from the circuit, thus delaying the increase—and with every decrease the magnetic field returns energy, and delays the decrease. So in whatever way the current changes, the magnetic field operates to delay the change; hence the name, *"Retardation."*

It takes some time to read this description of what we believe happens to an electrical circuit, but the actual operation is so exceedingly rapid, that it appears almost instantaneous, yet with delicate instruments it is perfectly possible to measure the interval of time which elapses between the closing of any circuit and the manifestation of electricity at its distant end. This interval of time is called the *"Time Constant"* of the circuit, and methods for finding the Time Constant will be given a little later. In the hypothetical illustration of the tank and spongy pipe, if the opening or shutting of the valve was performed sufficiently rapid, there would be no flow of current. With telephonic circuits we are dealing with sound waves that excite electric undulations of a thousand or more per second, ten times as fast as any commercial lighting circuit, so it is no wonder that retardation is so important a factor and makes its appearance and has to be considered in almost every telephonic apparatus.

TRUNK FROM LOCAL TO COMMON BATTERY

By J. K. Gemmill.

HEREWITH is given a simple trunk circuit from a local talking to a common battery exchange. While the *completed call* end is shown in full, the cord circuit has been omitted in the *originating call* end, but from the following description it will not be necessary to fully describe the *originating end* more than that it is adapted to any circuit using battery on tip and sleeve through repeating coil, and balanced supervision by relay in the bridge of the repeating coil.



Trunk from Local to Common Battery.

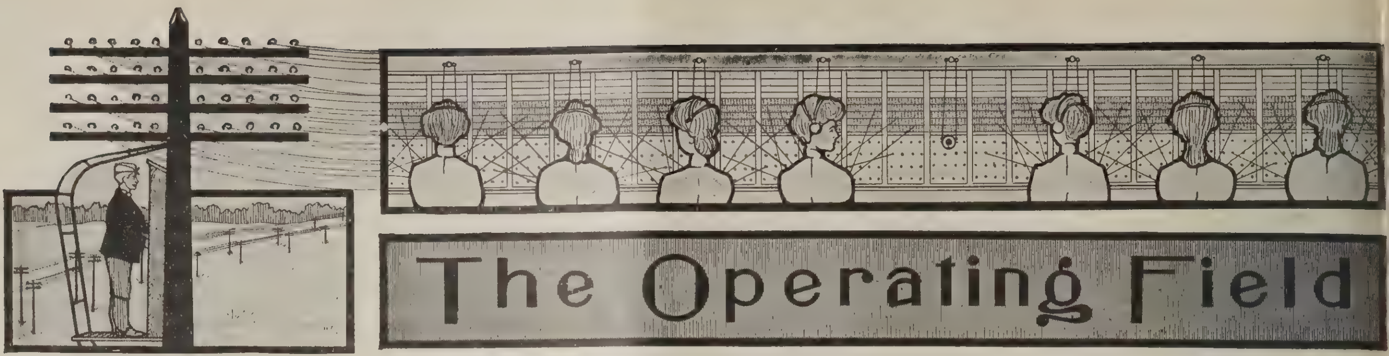
It will be seen that when the trunk is up, the 125 ohm relay on the sleeve side pulls up to common on sleeve of line, and the 125 ohm relay on the tip side pulls up by virtue of the completed flow of battery out sleeve, through instruments and back through tip side to battery through this relay. The party having answered, both tip and sleeve relays are up. When called party finishes and hangs up, tip relay releases and by means of the common, establishes and maintains a permanent ground or common to both the 20 volt lamp and the 100 ohm relay at the other end of the trunk. The battery feeding through the supervisory relay at the jack at the *originating end* then flows through the 100 ohm relay to the common ground, pulling up the armature of this relay, and, at the same time, by reason of the supervision on the cord circuit at this end informs the operator of the termination. When the plug is removed the 100 ohm relay releases and completes the flow of battery by way of contact on relay of the sleeve side of the trunk, through the common to armature contact, back common to lamp, through lamp to contact now closed on relay on tip side of plug, and from there to the other side of battery.

The *originating end* having received the signal to disconnect, and having done so, the operator at the *completed call* end then gets her supervision, which remains lighted until the operator removes the trunk from the local line called, at which time the light goes out.

This trunk is simple and not as costly as it would seem, and works very well on long lines, provided the resistance of the relay at the *jack* end be raised sufficiently to *work* over distances of from 12 to 15 miles. It also answers well for the ***extension cords*** sometimes called trunks in an exchange, where a toll in long distance board is separated by two or three rooms from the local board.

SENATOR FAIRBANK'S TELEPHONE SCHEME.

SENATOR FAIRBANKS, of Indiana, as soon as the regular session of Congress convenes, will take up a matter in which he is much interested. Just before the adjournment last spring, he offered a resolution calling upon the Postal Department to investigate the feasibility of using the telephones in the delivery of special delivery letters. The Senate would not make an appropriation at that time, as the proposition was new. Senator Fairbanks talks enthusiastically of the matter. He believes that the adoption of the rural telephone will make it possible for the farmer to receive his mail as quickly as the man in town. He would have it arranged so that the Postmaster could open the special delivery letter, and read it over the telephone to the man in the country. The rapid extension of telephone lines through the rural districts makes the scheme more easy than it would have been at the time he prepared it. He has talked with merchants and farmers and members of the Post Office Department, and they are all in favor of the plan. He says he intends to push the matter as rapidly as possible.



SURROUNDING A CITY—CINCINNATI.

THE telephone situation in Cincinnati is somewhat unique and many eyes are trained in that direction watching the possible outcome of the Independents' determination to enter that heretofore forbidden territory. Application for permission to string wires and lay conduit preparatory to building a first-class modern telephone system have time and again been turned down by the local authorities, but just at this moment the validity of a former grant of this nature is before the Probate Court in Cincinnati, with every prospect of being sustained and the laws give this grant many privileges that would make its decision, if favorable, possible for an Independent company to start immediate operation. In the many weary months of waiting and fighting, the Independents have not been idle, and to-day long distance lines radiate from all valuable outlying districts not directly within the city limits of Cincinnati. All these lines can be continued into the city proper and service established within a few days.

The old Bell Company in the city is only too well acquainted with this fact, so much so that the local Bell Company appealed to the parent Bell Company for permission to allow them to connect with these lines and give them service so that the possibilities of an Independent company entering the field would be removed and they could continue in the peace which they have so long profitably enjoyed. With this link closed study the map and see what a wonderful system the Independents have built in the face of almost insurmountable obstacles. The Independents have a franchise in one of the suburban villages, which is to be annexed to the city and therefore when annexed by virtue of the annexation law, it will have equal rights with any other company.

Those interested in the project are bankers, manufacturers and merchants. The moment the exchange is opened the company will be able to give long-distance service over toll lines and through exchanges already built to every town in Indiana except Evansville, all the towns and cities in Ohio, and to the whole of Kentucky, including Louisville, and beyond those States as far East as Philadelphia and Baltimore, north to Grand Rapids, Minneapolis, St. Paul; west to St. Louis and Kansas City; south to Memphis and Galveston. The following, in addition to the incorporators, are among the subscribers for stock: Peter G. Thomson, H. H. Bechtel, Charles Boldt, A. Nielen, Abraham Freiberg, Samuel Bing, Isaac Bing, B. L. Bing, Gus May, John W. Neil, Guy W. Mallon, B. W. Gilfillan, Joseph C. Schaf, Wm. F. Kuhn, E. I. Fisher, J. S. Holliday, Willard S. Wickard, Aug. M. Kuhn, Max. B. and Samuel S. Fisher, R. H. Carnahan, J. F. Evans, J. C. Johnson, A. L. Johnson, Ball Bros., T. F. Rose, W. E. Hitchcock, Edward C. Fletcher, Wm. N. Gates, secretary and treasurer.

When it is realized that by constructing twenty-five to thirty miles of pole line twice as many telephones can be reached as now, not one of which can be reached over the lines of the present Bell company, one is surprised that there has not before been a telephone plant constructed in Cincinnati. The company has not yet fixed its rates. The rates will, of course, be lower than those charged by the Bell company. It has been decided that there will be no party lines in the system, but every subscriber will have his own individual circuit, with the best long-distance equipment. The construction of the plant means that almost two million dollars of outside capital will be expended in the city of Cincinnati.

EXTENSION GRANTED EVERETT MOORE SYNDICATE.

AT a meeting of the remaining creditors of the Everett Moore Syndicate, which was held in Cleveland, Ohio, last Tuesday, it was agreed to extend the time of maturity for the remaining obligations eighteen (18) months or to April 1, 1905. The active management of the properties now held is placed in the hands of H. R. Newcomb, president Citizens' Savings and Trust Company; F. S. Dickson, president Federal Telephone Company, and H. A. Everett.

PORTLAND EXCHANGE OPENS NOVEMBER FIRST.

ON November first the Northeastern Telephone Company, will open its new exchange in Portland, Maine, which will serve 1,600 subscribers, which have already been secured. The exchange will operate on the automatic system. The company has expended several hundred thousand dollars in installing its service and will invite leading officials and newspaper men throughout the state to be present at the opening and inspect its plant.

CONVENTION OF KENTUCKY ASSOCIATION.

SECRETARY JAMES MARET, of the Kentucky Independent Telephone Association, is sending the following notice to its members:

"The fifth annual meeting of the Kentucky Independent Telephone Association will convene at Paris, Kentucky, on Tuesday and Wednesday, October 13 and 14, 1903. The first day's meeting will be called to order at 2 p. m. Every member of the Association and all Kentucky Independent Telephone people are requested to be present or send representatives. The growth of the Independent movement in our State, while not so great as in some other States, has been phenomenal and is not only holding its own with the old line opposition, but, in many instances, has left the former monopoly far in the rear in the number of telephones used and quality of service given. A number of the Kentucky Exchanges bought out by the opposition, in the past with the intention of crippling the Independent movement, wouldn't 'stay bought,' but rebuilt finer and better systems, notably: Paris, Nicholasville, Bowling Green, etc. The largest and most improved up-to-date exchanges in this and some other States are owned and operated by Independents. The opposition's 'long distance' is more than equaled in many States by Independent long distance service and old Kentucky will follow in their footsteps. There is a movement on foot which is expected to prove of vast benefit to the Kentucky field. The matter will be before the Paris meeting and from present indications will be carried to a successful issue."

The following programme has been arranged:

FIRST DAY, TUESDAY, OCTOBER 13TH, 1903, 2 O'CLOCK P. M.

Address of welcome, Mayor of the City of Paris.
Response, D. L. Pendleton, President of the Association.
Why We are Here, R. V. Bishop, Cynthiana.
Business Meeting.
The Past Year's Growth, E. M. Coleman, Louisville.
Old Bourbon in Telephony, Quincy Ward, Paris.

Depreciation, Henley V. Bastin, Lancaster.

The Outlook in Western Kentucky, H. K. Cole, Owensboro.

Discussion will follow each address or paper read.

SECOND DAY, WEDNESDAY, OCTOBER 14TH, 1903, 8 O'CLOCK A. M.

The Manager and his Corps.

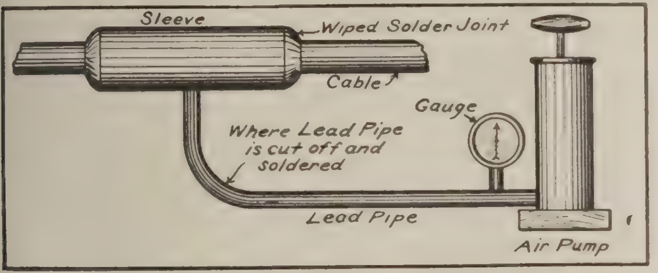
The Inter-State Association, Dave Prewitt, Pine Grove.

Toll Collection and Traffic Arrangements, James S. Brailey, Jr., Wauseon, Ohio.

The Outlook, John R. Allen, Lexington.

TO DETECT A FAULTY CABLE SPLICE.

THE following scheme is suggested to detect a faulty splice in a cable. An air pump is connected to the cable as shown in the drawing and a pressure pumped up which is indicated on the gage. Any decrease in the pressure within the cable indicated by the gage will show that there is a leak in the cable somewhere and that attention should be given to it. The pipe to which the air pump is connected is permanently wiped to the sleeve. When the test has finished the lead connecting pipe is cut off, plugged and soldered.



THE TELEPHONE CAUGHT THE HOLD UPS.

JOHN KERR, a wealthy farmer of East Springfield, Jefferson county, Ohio, was buncoed out of $3,000 recently by two sharpers, and two hours later they were run down near Bloomfield by a crowd of armed farmers who almost riddled the law breakers with bullets and then brought them to jail. The two men, who were dapper of dress and smooth of talk, had been corresponding with Mr. Kerr on an investment scheme. On this morning both appeared at his home. He consented to the proposition and one of them accompanied him to Steubenville, where he drew the money from the bank. They started to drive to the Kerr home, fifteen miles in the country, and ten miles out they met sharper No. 2. They held Mr. Kerr up and relieved him of the money and then dumped him out of the rig and drove off.

Mr. Kerr got to a farmer's exchange telephone and in a short time fifty farmers on horseback armed with rifles were pursuing and shooting at the fugitives, who were also using their revolvers. At last the sharpers' horses gave out and they took refuge in a cornfield where they were surrounded, wounded and captured.

A NICE COMPLIMENT FOR LOUISVILLE.

COMPLIMENTARY, indeed, is the following letter which was written from Cleveland to the Louisville Home Telephone Company by a traveling man. One who knew service when he used it.

THE HOLLENDEN HOUSE,
CLEVELAND, September 23, 1903.

Manager Home Telephone Co.,
Louisville, Ky.

Dear Sir—

I wish to compliment you upon the very quick and satisfactory service rendered by your company in Louisville.

Incidentally, I might ask if you use any different instruments from the rest, so that I might recommend them to Columbus, Toledo and others.

To we who travel and have use for telephones, such service as we get from you in Louisville is to remembered.

Yours truly,
E. B. WILSON.

The recipient company should rightly be proud of such testimony.

A COLORADO INDEPENDENT COMPANY.

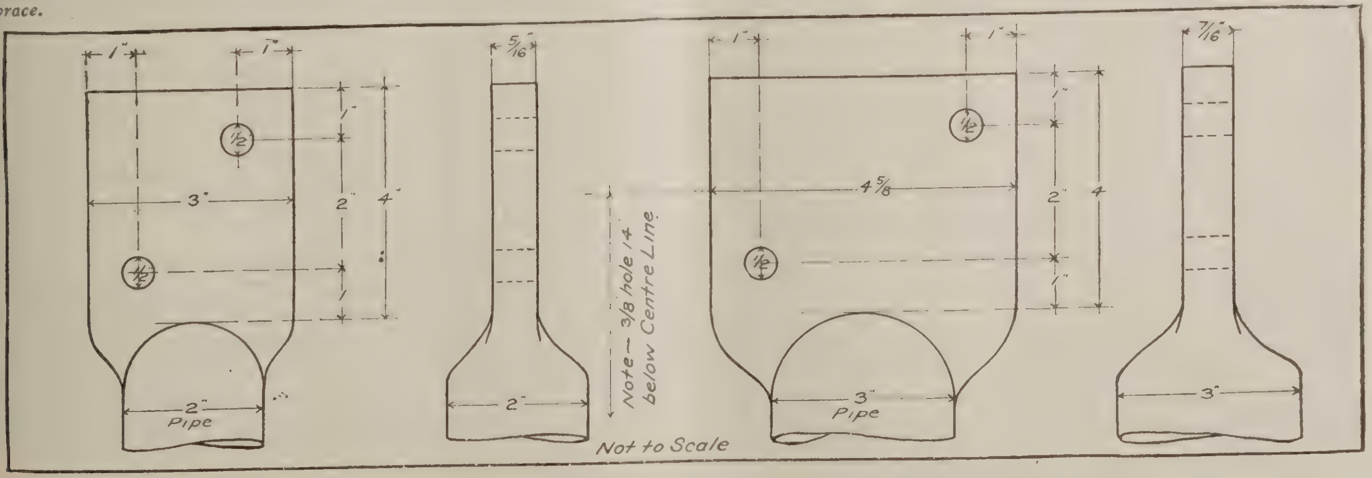
STOCK in the Wray Telephone Company, of Wray, Colo., is being sold rapidly and the work of constructing new lines is being pushed. The transfer of the Haigler and St. Francis lines, known as the Neb-Kan-Rado Telephone Company, has been completed and they are now a part of the Wray telephone system. The business men of Haigler have subscribed for $1,600 stock. Citizens along the route from Haigler to Idalia are taking stock and a substantial sum has been subscribed to build the line. Forty-five new telephones were shipped to St. Francis recently. Two thousand dollars has been subscribed to build a line from St. Francis to Jaqua, a distance of twenty-one miles. A building and two lots in Wray have been purchased to be used as the headquarters and exchange of the company. Mr. Spere is the promoter of the company and he is working night and day to get the system into good shape.

TELEPHONE COMPANIES IN OHIO.

IN 1894, when there were only nine telephone companies in Ohio, and they were allowed to return their own property for taxation, the revenue to the State was very low. As a consequence, their appraisement was given to a board of State officials. In 1894, the total valuation of telephone and express companies was about $2,000,000. This year, the valuation of the telephone companies, which the State board is now placing, will be between $10,000,000 and $11,000,000 alone. The number of companies has grown from 9 to 284.

BOILER TUBE TELEPHONE POLES

In the issue of this paper for Oct. 3, 1903, a telephone line in which boiler tubes were used for poles was described. Herewith are shown detail drawings of the manner in which the tops of the boiler tubes were formed to receive the cross arms. The drawings give dimensions for both 2 inch and 3 inch tubes. With the 2 inch tubes no arm braces are used. With the 3 inch tubes a ⅜-inch hole is drilled 14 inches down, as indicated, to receive the bolt to hold the arm brace.



The Editor's Page.

THE BELL CONTINUES ITS "CUDGEL" METHODS.

INDEPENDENT telephone men in all parts of the country are watching with keen interest the developments as set forth in THE AMERICAN TELEPHONE JOURNAL, in the efforts of the Bell Telephone Company to make capital out of its control of the Kellogg Switchboard & Supply Company. That its movements would be made in the dark, was, of course, a foregone conclusion. Even if the Bell had no past history, the way the sale was originally kept quiet for nearly two years after the transaction, would be proof enough of this fact. All the nasty details of the sale were finally brought to light, and there is not the least question but that all its further movements will finally be shown up to the public.

No one interested in Independent telephony will question for a moment the motive which prompted the peculiar purchase of the Kellogg Company by the Bell. It was simply and solely for the purpose of crippling Independent competition. THE AMERICAN TELEPHONE JOURNAL in previous issues has quoted from statements floated by the Bell press agents showing that the Bell had commenced the work of endeavoring to frighten timid capitalists from investing their money in Independent telephone securities. Few people, even among the general public, will be fooled by these ingenious falsehoods, which have been spread broadcast by the agents of the company; and it is certain that no one who is at all acquainted with the Independent telephone business will pay any attention to them. They are looked upon as little more than ludicrous. And yet, this newest campaign of the Bell company against the Independents is interesting to watch. There are sure to be many interesting developments, just as there were in the Berliner patent case, and although all Independent telephone men know that no great harm will be done by these latest manoeuvres, they are at the same time sure that the Bell company will not lose an opportunity to harass and annoy the Independent companies. When the history of the under-hand methods employed by the Bell interests to secure control of the Kellogg company, and the methods used after the purchase are viewed in the light of subsequent events, the marvel will be, not that so-called reputable business men would soil their hands with so dirty a transaction, but that they could possibly hope in the end to profit thereby.

Of course, a layman with ethical and moral ideals might marvel at the strange doings and harshly class the transaction in the category of highway robbery and crimes of similar nature. It must be remembered, however, that he is not in touch with Bell business methods. He cannot, in the nature of things, appreciate the exigencies of business which will lead a corporation to stoop to such mean methods. Independents who have long been familiar with the frantic efforts of the Bell interests to protect their monopoly, regardless of ethics or morals, or individual and private rights, are not, and will not be surprised at anything that may be done. But the wonder is how sane men can expect to reap more than temporary advantage from such transparent methods.

There is an old saying applicable to the case: "Whom the gods would destroy they first make mad." The first Independent telephone company which entered the field gave the Bell a well-developed case of hysteria which has developed into a more malignant form with each succeeding year. The public is in sympathy with a fair and honorable fighter, whether in the business field or in physical warfare. The Bell interests, therefore, would have gained in the eyes of the public if they had come out into the open and based their claims for patronage upon superiority of service and fair rates. But what are people to think when a great corporation fears to meet honest competition, and resorts to sandbag methods in its efforts to keep out such competition?

RENEWED EFFORTS TO SCARE TIMID INVESTORS.

The secret tactics employed to secure control of one of the leading Independent manufacturing concerns for the purpose of embarrasing Independent companies using the apparatus manufactured by that company, are in keeping with other misguided efforts made by the Boston financiers to head off legitimate competition and keep watered telephone stock on a dividend-paying basis. The Berliner case which was dragged along through the courts for so many years that it might in the meantime be used as a club against Independent companies to drive them from the field and frighten timid investors, is now ancient history, but it is a fair sample of Bell methods. It seems, however, that the Bell thinks a club a better fighter against competition than merit; and so it is trying to adapt its new purchase as a cudgel. Another case that could be mentioned is of a certain town in Illinois. Up to within a few years the Bell company monopolized the town. But then local capitalists, in order to secure for themselves an adequate telephone service, organized an Independent company. Instead of perfecting its service and holding the field by merit, the Bell company endeavored to drive the new company out of the town. After the Independent company had secured a franchise and expended some one hundred thousand dollars on its plant, the Bell obtained an injunction restraining the Independent company from paralleling the Bell lines.

As this would have been fatal to the life of the Independent company the matter was threshed out in the courts. Months of delay ensued, and a great deal of new law was made, but in the end as usual, the old company was beaten to a standstill in both the circuit and supreme courts. To-day the Independent company is doing a greater business than the Bell company. It cost the Bell thousands of dollars to press this suit, and now an action is about to be brought to recover damages which resulted to the Independent company by reason of the injunction and consequent delays.

In the Kellogg case the minority stockholders have brought suit to annul the sale. Judging from the past history of the Bell's "club methods," such as the Berliner case and the one just mentioned, the Kellogg case will be dragged through the courts with all the delay and attending vexations possible, but in the end, the Bell's unsavory transaction will avail nothing, and the Bell stockholders will have another large slice cut out of their dividends in order to pay the bill.

Meanwhile the Bell Telephone Company is trying to hoodwink the public on the one hand as to the nature of the Kellogg purchase, and the operators, on the other, as to its ultimate intentions. It is idle to suppose that the Independent operators do not see through the trick. They do not need a blackboard exposition to show them what would happen if they should become dependent for equipment upon the Kellogg company, which is now absolutely controlled by the Bell interests

Neither can good business men be scared by the threats of monopoly. It is still impossible for the Bell company to regain its old monopoly of the telephone instrument output. The Independent manufacturers have already devised apparatus, and will soon be in a position to sell it, that will work perfectly with the Kellogg apparatus in use. Independent operators may therefore look upon the frantic struggles of the Bell company with amusement, rather than concern.

FOREIGN CURRENTS

By "The Arrester."

NOTE has been made before in these columns of the gradual extension of long distance international telephony in Europe. Announcement has lately been made of the extension of the Anglo-Belgian service so as to make telephonic communication, recently established between London and Brussels, available between London and a number of Belgian cities, such as Antwerp, Bruges, Charleroix, Ghent, Liege, Louvain, Malines, Ostende and several other places. On the other hand, a number of English provincial cities will be able to talk to Brussels and a few of the principal Belgian towns mentioned above. Among the English cities to which the new service will be available are important commercial and shipping centres such as Birmingham, Bristol, Cardiff, Derby, Nottingham, Sheffield and Southampton. The rate in all cases is $2 for three minutes' conversation. An improvement in the facilities furnished by the London-Paris telephone lines is also announced. This will be in the direction of making a "night" rate of half price for messages exchanged after business hours. The day rate is $2 and the night rate will be $1. It will be necessary, however, to get the benefit of the reduced rate to make an engagement to use a certain number of periods per month; this seems a restriction likely to defeat the object of the reduction, as it will tend to choke off traffic.

Long Distance System for S. A.

REFERENCE has been made from time to time to the opportunities for telephone development arising in South Africa. The latest news from this part of the world is that an extensive long distance telephone system is being planned to connect up the principal towns in Cape Colony and the Transvaal. This will involve lines over a thousand miles long and experiments are being conducted at the Cape to determine the minimum weight of copper that should be used to secure good talking over the distance involved and under the conditions obtaining in South Africa. The Cape Postoffice Department has consulted Sir William Preece, who states that the weight of copper wire to be used can only be decided by practical test. The wire ordinarily used varies according to distance from 150 lb. to 800 lb. a mile, and for long distances Sir William Preece does not advise a lesser weight than 800 lb., unless climate and other conditions conclusively show that a lighter gauge would give effective results. It is expected, however, that in South Africa the electrical and climatic conditions will prove more favorable than in Europe and America, and that even for the longest distances the weight of copper can be reduced without serious risk of failure.

Why So Much Copper

THIS is rather good, as the "electrical and climatic conditions" in these United States are somewhat of the strenuous order, yet no wire for long distance telephony has ever been used here of much more than half the weight recommended by Sir William Preece. Now that the Boer war is over, there is no reason why Capetown should not talk to Johannesburg over a 425 lb. wire as easily as Chicago does to New York. To build the circuits with 800 lb. wire would largely increase the cost of construction beyond what is necessary, without corresponding advantages. The estimated cost of the main trunk line, which would be run on separate poles from the telegraph wires, is put at a round million of dollars. The Cape Postmaster-General rather innocently remarks that the charges for conversations would have to be high as compared with telegraph rates, and he thinks the annual expenditure for maintenance would be a heavy item. The scheme is to await the results of the experiments now going on, but, incidentally, sanction is asked for the money required for the establishment of exchanges at a number of towns in Cape Colony. Until these are in operation it is not considered that a long distance system could be conveniently used.

Aluminum Conductors

NOT very much has been heard of late of aluminum as a material for overhead wires. A note in the *Electrical Engineer* gives some account of a discussion on the subject at the recent meeting of the British Association. Mr. J. B. C. Kershaw read a paper on "Aluminum as an Electrical Conductor," and Prof. Ernest Wilson one with the imposing title, "The Electrical Conductivity of Certain Aluminum Alloys as Affected by Exposure to London Atmosphere." The papers describe experiments made with rods and wires of aluminum under exposure to the atmosphere, but the conclusions arrived at by the two experimenters are directly opposed. Mr. Kershaw exposed his samples in Lancashire and Prof. Wilson experimented on the roof of King's College, London. All the Lancashire specimens gained in weight during exposure and all were pitted and corroded, especially on the underside, where the water drops had collected and dried. Mr. Kershaw thinks aluminum manufacturers have yet to prove the metal a satisfactory substitute for copper, especially for work done near the sea coast. Prof. Wilson found little change in his alloyed specimens. In the discussion the different results were attributed to the different materials used in the two sets of experiments, in the one case pure aluminum and in the other alloys of different kinds.

Municipal Telephony

MUNICIPAL telephony has been well to the fore lately in Brighton. The Glasgow system has been raked over the coals in a lively fashion by two such serious journals as the *Electrical Review* and *Engineering*. The *Review* thinks that the recent discussion on the Glasgow municipal telephone accounts shows that the enterprise is in an unsound state, and thinks that if the accounts and statistics of the system were published in full many points of weakness would be shown up. The *Review* advances the theory that the Glasgow authorities quote in their discussions only the number of stations or instruments and not the number of actual subscribers' lines. In this way the large amount of capital spent, as compared with the amount estimated to be required, is not satisfactorily explained, because the total number of instruments is put forward as if it represented the total number of subscribers. The *Review* also thinks that the accounts do not show the real state of affairs, inasmuch as no depreciation is charged and it is evident from the auditors' report that operating expenses are being charged to capital. In spite of these pointed remarks the Glasgow officials show no desire to publish their accounts and statistics in full.

THE WHOLE FAMILY USED THE TELEPHONE.

SUPT. PREBLE, of the Black River Telephone Co., of Lorain, Ohio, has some funny experiences, dealing as he does with all sorts of people. When the South Lorain exchange was opened one of the first to make application for a telephone was Joseph Dam. Mr. Dam explained that he wanted the telephone, but the rest of the family were somewhat opposed to it. The telephone was put in, however, and Mr. Dam enjoyed it very much. Mr. Preble says it was not long until the whole Dam family was using it.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law.
They will be answered and explained by Mr. McMillan on this page.

FAILURE OF TELEPHONE COMPANY TO FILE ANSWER.

IN the case of the Southern Bell Telephone and Telegraph Company vs. Earle, just decided by the Supreme Court of Georgia, the company was sued for breach of contract in the city court of Atlanta. The law at the time provided that if a defendant failed to file his defense on or before the first day of the term to which the suit was returnable, he lost his right to file any defense and the judge had no authority to allow him to do so. The company was unfortunate enough to be caught in just this predicament. The plaintiff, Earle, entered into an agreement that the company's plea and demurrer, which were in reality filed on the second day of the term, might be filed as of the first day. The plaintiff afterwards repudiated the agreement. There was no consideration for the agreement and the court consequently held it revocable at the will of the party making it.

The defendant was properly served, but the return of service incorrectly named the defendant company as "the Southern Bell Telephone Company." Subsequently the return, by leave of court, was so amended as to set out the name of the defendant correctly. The defense, alleging this as an excuse for not filing its plea and demurrer in time, the court held that the original return was valid and did not need amendment, and that the defendant was not thereby excused from filing its defense until after the return had been amended.

The petition of the plaintiff was ambiguous in failing to make clear whether the cause of action was in contract or in tort, but the allegations and prayers of the petition, taken all together, made it manifest that it was the intention of the plaintiff to sue for a tort (or wrong) growing out of the breach of a contract. No demurrer being properly on the records, the Supreme Court held that it was not error to treat the suit as an action *ex delicto* and to charge, since the evidence warranted it, the law as to punitive damages. Neither was it cause for reversal to charge that in any event the plaintiff would be entitled to nominal damages, and to recover for all the damages sustained by him up to the time of trial. Southern Bell Telephone & Telegraph Co. vs. Earle, 45 S. E. 319.

A QUESTION OF RIGHT OF WAY IN KENTUCKY.

THE East Tennessee Telephone Company has filed a suit against the Southern Electrical Construction Company to secure an injunction restraining the defendant, which is building the line of the Home Telephone Company, from placing telephone poles on the same side of the roads throughout the county as that on which the complainant's poles are set.

INJURIES RECEIVED IN A TELEPHONE EXCHANGE.

AT Lampasas, Texas, the Southwestern Telegraph & Telephone Company and the Lampasas Electric Light Company have been made defendants at the suit of Clyde Newton, who asks for $10,000 actual and $10,000 exemplary damages, the latter being sought as a punishment on the company, instead of a reimbursement to the plaintiff for injuries suffered. Newton was night operator in the telephone office He alleged that last January, while he was at work, the wires of the two defendant companies became crossed, so that when he took hold of an electric light bulb to move it in front of the switchboard, having the telephone receiver over his head at the time, a strong current of electricity passed through his body, knocking him senseless to the floor, burning off his right ear, his hair and the flesh to the bone, and also burning his hand and body in several places. Being a minor, his father sues as his "next friend."

SUIT FOR VIOLATION OF TOLL CONTRACT.

THE North Manchester Telephone Company, of Indiana, is suing the Home Telephone Company for $10,000 damages for alleged violation of a contract to deliver its toll business to the former corporation. The plaintiff alleges that the defendant has been delivering its toll business to the Eel River Telephone Company, a rival of the North Manchester Company. In addition to the damages asked, the petition prays for a perpetual injunction to prevent the Home Company for delivering its toll business to the Eel River Company. The suit was begun in Wabash County, but has been removed to the Delaware County Circuit Court at Muncie, Ind.

KILLED BY A HIGH TENSION WIRE.

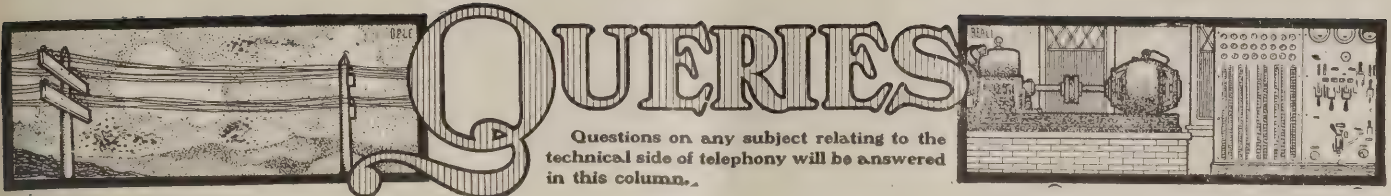
JAMES ANGLINA, of Seneca Falls, N. Y., has been awarded a verdict of $5,000, with costs, in a suit for personal injuries against the Home Telephone Construction Company. The case was heard by a jury in the Supreme Court. Last April, while assisting as lineman in the construction of a telephone line, a live wire fell on the back of his neck while he held another in his hand. The shock made him unconscious, and he fell from the pole where he had been working to the ground, a distance of twenty feet. He was subjected to a pressure of twenty-two hundred volts. This is more than is required in criminal electrocutions to cause death.

SUIT FOR CHILD'S INJURIES.

THE Cumberland Telephone & Telegraph Co. is defendant in the United States Circuit Court at New Orleans at the suit of Scott Pete, who seeks $25,000 for damages to his little child. He alleges that the child was seriousl burned on the Fourth of July by a live telephone wire which had fallen and become entangled with the wires of the street railway. The petition avers that the telephone company was at fault in permitting the wire to remain dangling and that the child is a cripple for life because of the injuries received.

TELEPHONES IN GERMANY AND FRANCE.

IN a recent consular report this information is given concerning the telephones in the German Empire and in France: "In Germany there were 2,411 cities or towns having public municipal telephone systems, with 305,795 connections. France had 1,199 telephone plants, with 72,480 connections."



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

CUTTING OUT OPERATOR'S TRANSMITTER.—(212.)

What is the usual way of fixing the operator's transmitter at the switchboard so that when she is listening on a line the noises in the office cannot be heard by the person talking? T. F. A.

There are two common methods of accomplishing this result, both of which will have the desired effect. In the first method, which is shown in Fig. 212a, a small push button is mounted in the key board and one of the battery leads going to the transmitter connected through it, so that when the button is depressed, the battery circuit is opened and consequently the transmitter is rendered inoperative and all possibility of noise being conveyed to the line from the central office removed. In the second arrangement, which is shown in Fig. 212b, a push button is also mounted in the key board and wires led to the button from the terminals of the secondary winding of the operator's induction coil, the button having its contacts arranged so that when it is depressed it short circuits the secondary winding of the coil. This arrangement is probably preferable to that shown in Fig. 212a, as there is, in this method, practically no click audible to a person listening on the line when the button is depressed.

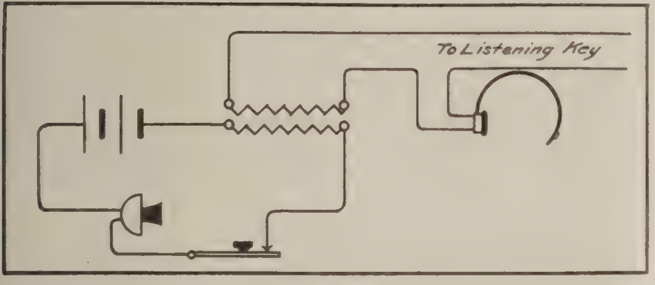


Fig. 212a.

A MAGNETO QUESTION.—(213.)

How should the battery power wet or dry be applied to an ordinary hand generator to make of it a direct current motor? J. F. R.

You could not make a direct current motor out of a magneto generator without putting on it a commutator and brushes

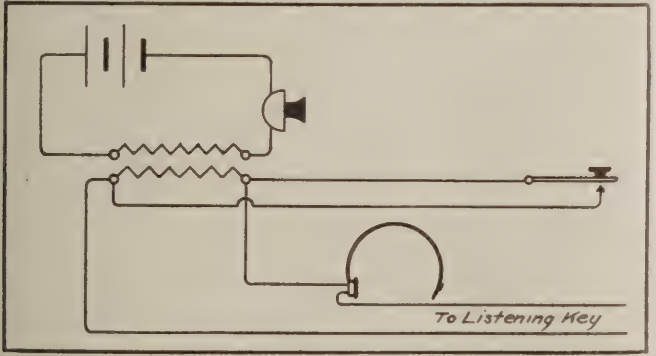


Fig. 212b.

A magneto generates an alternating current and has no commutator. Considerable labor would be involved in making the change.

A NOVEL TELEPHONE TRANSMITTER.—(214.)

To decide a bet will you please tell us whether there was ever a telephone transmitter used which used a piece of wet paper between the electrodes? I do not see how such an affair would be practical. P. T. T.

Yes, such a transmitter was proposed and patented November 19, 1877. A vertical section of the instrument is shown in Fig. 214. For obvious reasons this form of transmitter never came into very general use. As the figure shows, the mouthpiece was horizontal instead of vertical. As is evident, instead of granular carbon between the electrodes, a piece of absorbent paper was arranged, which was kept moist by capillary attraction from a vessel of water below the diaphragm. This semi-conducting paper, like carbon, changed its resistance under the varying pressure caused by the sound waves impinging on the diaphragm.

PHANTOM CIRCUIT.—(215.)

What is a phantom circuit, and how may telephones be connected on lines used with other telephones and thus afford privacy? J. F. R.

A general definition of a phantom circuit would be a circuit which uses the two wires of another *metallic* circuit for one leg and the ground for a return. On page 203 of our issue of September 26, a diagram of a phantom circuit is shown in Fig. 200. In this case the telephones S_3 and S_4 are on the phantom circuit and S_1 and S_2 are on the regular circuit. The duplexed circuit shown in this figure is a phantom circuit. The theory of the circuit is also explained and the connections shown.

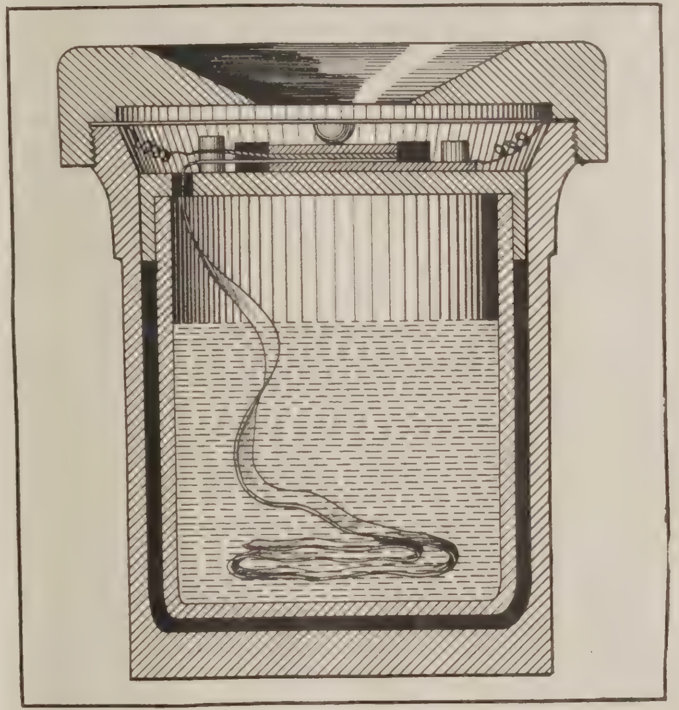


Fig. 214.

AMPERE HOUR.—(216.)

What is meant by the length of time an Ampere Hour as applied to storage batteries? G. W. L.

An ampere hour is not a length of time but is an electrical unit. An "ampere hour" is that quantity of electricity which will pass a point in a circuit through which one ampere is flowing in an hour. In other words, if two amperes of current were allowed to flow in a circuit for a period of one hour, the quantity of electricity which would pass would be two ampere hours. To get ampere hours multiply the current flowing by the time it flows.

PATENTS ISSUED

TIMING DEVICE FOR TELEPHONE SWITCHBOARDS.

B. F. Merritt, of East Orange, N. J., patents (No. 740,889) an arrangement for timing the length of telephone calls. The object of this invention is to afford a mechanical device for indicating time and hours, minutes and tenths, or other decimal fractions of a minute, and to arrange a means for timing the length of telephone conversations by indicating the elapsed time, even when of extreme brevity. This invention is shown in Figs. 1, 2, 6, 10, 11 and 12. It includes a series of four rotating disks or wheels, each of which bears a numeral on its periphery. Progressive movement is applied to the first wheel, which periodically advances the third and so on. The progressive movement is applied to the tenths of minute wheel by means of a pall and ratchet. The bell is operated by an electro magnet shown in Fig. 12. The circuit-closing device is a clock, so arranged as to close the circuit ten times in one minute. As a result, the figures upon the dial wheels show with great accuracy the time which elapses. As shown in Fig. 2, the device is enclosed in a case *60*, which has two contacts *21* and *22*, that are designed to engage with the spring jacks in a switchboard, and thus the device in question may be plugged into a toll line and made to automatically indicate the length of time of conversation.

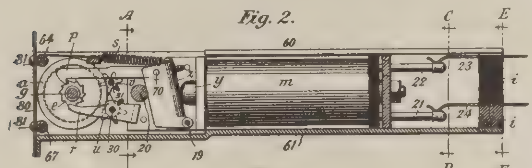


Fig. 2.

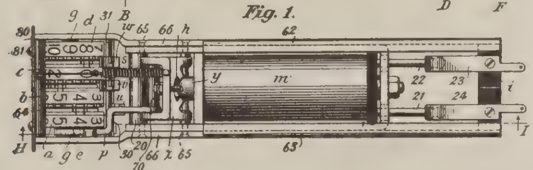


Fig. 1.

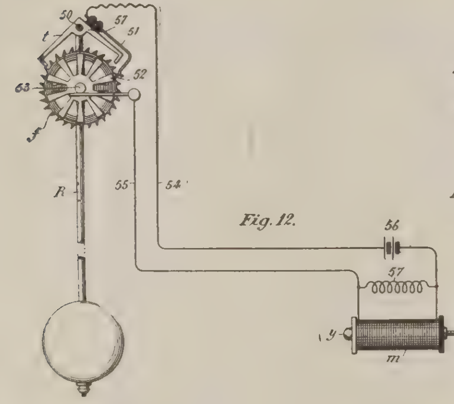


Fig. 12.

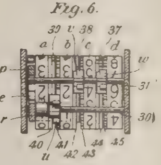


Fig. 6.

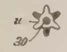


Fig. 10.

Fig. 11.

ANTISEPTICAL APPLIANCE FOR TRANSMITTERS.

S. J. Ballard, of Los Angeles, Cal., patents (No. 740,512) an improved appliance for protecting the antiseptical mouth pieces of telephone transmitters. This device is shown in Figs. 1 and 3. The object of the invention is to provide an improved method of protecting both the mouth piece and ear pieces of telephone transmitters and receivers in such a manner that they may be unable to convey any noxious effluvia from person to person. An additional feature of the invention is to provide an improved advertising medium and memorandum pad. As is shown in Figs. 1 and 3, there is a light frame work *i* which carries a roller *c*, pivoted in the frame work at *i*. This roller is supplied with a strip of paper which may be rendered antiseptic or otherwise treated. In the rear of the frame work there is a clip *k*, which serves to hold the paper in position. By this means the transmitter may be protected and also the portion of the frame work at *h* can be made to serve either as a memorandum pad, or can contain any printed legends that may be desirable.

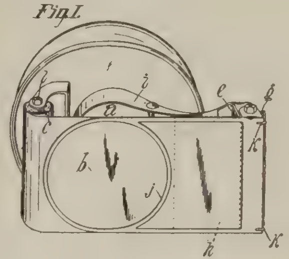


Fig. I.

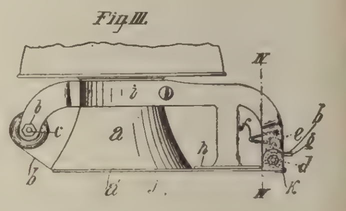


Fig. III.

POLARIZED BELL.

Frank B. Cook, of Chicago, Ill., patents (No. 740,744) an improved magneto bell. The object of this invention is to provide a magneto bell in which the yoke carrying the armature of the bell shall be arranged to be easily adjusted, in order that the bell may have the greatest efficiency. This invention is illustrated in Figs. 1 and 2. Fig. 1 is an elevation and Fig. 2 is a section. The essential feature of the invention is the arrangement of the yoke *g2*. The yoke is suspended by means of two screws *h* which are threaded into the posts *I*. Two springs *h'* are arranged between the yoke and the posts, and thus by rotating the screws *h*, any desired adjustment can be secured.

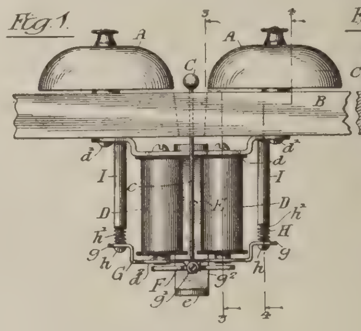


Fig. 1.

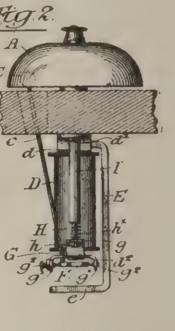


Fig. 2.

REED'S SELECTIVE SIGNALING SYSTEM.

Mr. S. A. Reed, whose patents number 737,870 and number 737,869, which were reviewed in a recent number of our paper, has sent us the following supplementary to our review of his patents: "The polarity feature is not essential to the operation of the system, as a neutral relay can be substituted for the polarized relay, with slight modification. The relay *Y*, shown in the figure accompanying the review of the patent, with one polarity, switches in all the selectors, and the other cuts them all out and switches the telephone set at the selected station, locking out all the others. The system, instead of being affected by voltage, is affected by a division of the battery current between the two sides of the line and the ground, in proportions differing for each station and adjusted to produce zero current in the selector *Z* at the call station on the Wheatstone bridge principal."

The following statements, made in our review, should be modified: "In Fig. 4, *H* is the common battery. By means of the key

(*Continued on following page.*)

THE ELECTRICAL RESISTANCE OF TREES

DR. STONE, botanist of the Hatch Experimental Station at Amherst, Mass., has been making experiments inquiring into the effect of electric currents on trees through which the electric conductors run. The conclusions arrived at should be of much interest to electric light and railway men. In his report, Dr. Hatch says: "On the whole, the cases of killing trees by escaping electricity are very rare, and by no means so numerous as is generally believed. Because a large number of trees, adjacent to electric railroads, happen to become sickly, it must not be concluded that electricity is the cause of these abnormal conditions in all cases. In cities and towns, where most of the sickly specimens exist, there are various adverse conditions with which the trees have to contend. It is, therefore, quite essential in diagnosing diseased conditions that these various factors be taken into consideration before forming definite opinions as to the real cause responsible for their abnormal condidtion."

	Maple. (Ohms.)	Elm. (Ohms.)
Outer bark		192,000
Middle of inner bark (cortex)	29,900	11,300
Cambium (vital layer)	18,000	10,698
Wood, ¼ in. in from cambium	138,000	98,700

In the course of the experiments the resistances of the trunks of trees of several different species were measured and the results arrived at are of considerable interest. The following data which was abstracted from the report of the experiments will give the telephone man an idea as to what may be the resistance of a "tree ground."

"The electrical resistance exhibited by trees is quite large, otherwise considerable more injury might result when live wires carrying strong currents are brought in contact with them. The resistance offered by 10 feet of the trunk of a maple and elm tree, 12 inches and 18 inches in diameter, respectively, is shown in the accompanying table.

"These figures, which are the result of only one test taken during the month of June, show that trees possess considerable electrical resistance. Such resistances as are shown in the table are capable of cutting down tolerably high currents to an insignificant amount. As might be expected, the cambium or vital tissue and the inner bark containing the phloem, show the least resistances. The resistance of the outer bark of the elm tree was reduced quite perceptibly after turning a hose on it for four hours. The bark, however, in the elm is more differentiated than in the maple, and the electrodes in the middle or inner-bark test in the elm were practically in the layer known as the phloem.

These resistances were taken with a Wheatstone bridge. Others have been estimated from the voltage and current passing through the tree. In all cases the electrodes or wires were driven into the tree so as to penetrate the wood. Some of these are:

A maple tree 18 inches in diameter, gave a resistance of 20,000 ohms for 16½ feet of its trunk. The same tree gave 11,000 ohms for seven feet of the trunk, and 7,000 ohms for one foot.

A pear tree, two feet eight inches high, 1¼ inches in diameter at the base, gave a resistance of 290,000 ohms when the current passed from the root extremities to the top of the tree, or practically a distance of three feet.

A sunflower seedling, 17 inches high and three-sixteenths inch in diameter, gave a resistance of 25,000 ohms for one inch of stem and three inches of the root, while a slightly larger plant of the same species gave 7,500 ohms, for one inch of stem and one half inch of moist soil.

FOREIGN LONG DISTANCE TELEPHONE RATES

The accompanying table was compiled by F. Dagger, of Toronto, Canada, and was published in the October number of the "Canadian Engineer," in an article "The Need of a General Telephone Act," in which the advisibility of the government requiring telephone companies to build to specification is taken up and also the matter of the regulation of rates:

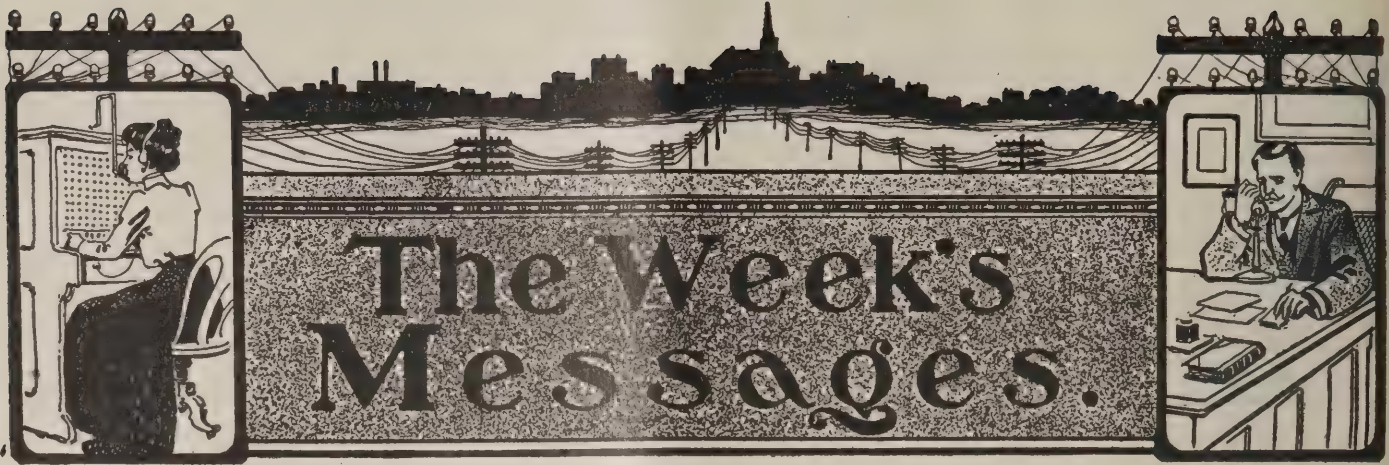
LONG DISTANCE RATES IN EUROPEAN COUNTRIES, THE UNITED STATES AND CANADA.

	Distance in Miles.									
Country.	20	40	80	120	160	200	240	280	400	600
United States and Canada* (Bell)	12c.	24c.	48c.	72c.	96c.	$1.20	$1.44	$1.68	$2.40	$3.60
Great Britain*	6c.	12c.	24c.	36c.	48c.	.60	.72	.84	1.20	1.80
Austria	12c.	20c.	28c.	40c.	40c.	.40	.40	.40	.60	...
Bavaria	10c.	10c.	24c.	24c.	24c.	.24	.24	.48	...	...
Belgium	Free	20c.	20c.	20c.	20c.	.58	...	...	...	...
Denmark	Free	Free	26½c.	40c.	..	...	...	.53	.53	...
Finland	2¼c.	2½c.	4½c.	6c.	9c.	.11	.13	.15	...	...
France	10c.	10c.	20c.	20c.	29c.	.38	.38	.48	.66	.96
Germany	6c.	12c.	24c.	24c.	24c.	.24	.24	.24	.36	.96
Holland	20c.	20c.	..	..	..	...	...	...	...	...
Luxemburg	Local rate covers free communication between all points.									
Norway	7c.	7c.	7c.	7c.	13c.	.13	.13	.13	.44	...
Roumania	26c.	26c.	48c.	48c.	66c.	.86	.86	1.04	...	...
Spain	13c.	13c.	24c.	24c.	34c.	.43	.43	.53	.72	1.00
Sweden	Free	Free	8c.	8c.	13c.	.13	.13	.13	.20	.27
Switzerland	6c.	10c.	15c.	15c.	15c.	.15	.15	.84	1.17	1.68
Wurtemburg	10c.	10c.	10c.	10c.	10c.	...	...	...	...	...

* Half rates at night.

REED'S SELECTIVE SIGNALING SYSTEM (*Continued from opposite page*).

K', a number of contacts are provided, each of which increase the resistance around the battery." In the ordinary sense *H* is not the common battery, inasmuch as the patent describes a magneto system with local apparatus, although the present patent also covers a common battery system, which has been perfected. *H* is a battery used solely for selection and does not remain on the line to supply the talking current. The keys *K'* do not vary the resistance *O* around the battery, but ground some one particular point of such resistance as *a*, *b*, *c*, *d*, or *f* (note ground on *K'*). Each selector *Z* is in a ground branch lead off from a tap of the winding of this 1,000 ohm relay *Y* bridged between the line wires at the stations. These taps all differ from each other as to their position on the potential gradent established, while the selectors are connected to the line and the grounding of the corresponding points *a*, *b*, *c*, *d*, or *f* at the exchange causes such a division of current as to render the desired selector neutral and thereby to permit the signals and talking circuits to be closed exclusively at that particular station when the battery is reversed. The original description would intimate that the patent was for a strength and polarity system, which is not the case, as the principle on which it operates is in an original class. It is trusted that this explanation will clear any doubtful points.



The Week's Messages.

FINANCIAL

SANTA ANA, CAL.—The Home Telephone Company has filed with the county recorder a deed in favor of the Title Insurance and Trust Company of Los Angeles for all of its lines, apparatus and buildings to secure an issue of $100,000 gold bonds bearing 5 per cent. interest.

NEW BRITAIN, CONN.—The Farmington Valley Telephone Company has just paid its fifth regular semi-annual dividend of 3 per cent.

INDIANAPOLIS, IND.—The New Long-Distance Telephone Company of this city has declared a quarterly dividend of 1 per cent. on stock.

NORTH ADAMS, MASS.—It is expected that the New England Telephone Company will petition the city council for permission to put its wires on Ashland street underground.

BATTLE CREEK, MICH.—The Calhoun County Telephone Company has asked permission to lay conduits in several streets in the city.

WALTON, N. Y.—The Butternut Valley Telephone Company has increased its capital stock from $3,000 to $6,000.

EDDYSTONE, PA.—The borough council has granted permission to the Delaware-Atlantic Telephone & Telegraph Company to lay its wires underground.

ERIE, PA.—The stockholders of the Mutual Telephone Company will meet on November 27th and vote on a proposition to increase the capital stock of the company from $72,000 to $100,000.

PHILADELPHIA, PA.—The Keystone Telephone Company reports net earnings for September, $20,996, compared with $20,728 in August; $19,431 in July, and $21,433 in June.

FRANCHISES

SAN DIEGO, CAL.—H. T. Richards, who conducted the survey of the San Diego Eastern road, was here recently, interviewing the Eastern men and the council regarding a franchise for a new telephone system. Former Mayor Hanford, of San Bernadino, is also interested in the new system.

MACKINAW, ILL.—The Mount Telephone Company has applied to the city council of Mount for a franchise to construct and operate a system.

WABASH, IND.—The Central Union Telephone Company has at last submitted the draft of an ordinance asking for a new franchise to do business in this city for twenty-five years. The company has been operating without a franchise and was ordered to remove its poles and wires. It is highly improbable that the franchise will be granted.

SIOUX CITY, IA.—The Sioux City Telephone Company has been granted a franchise.

CHATTANOOGA, TENN.—The Board of Aldermen have passed an ordinance granting a franchise to the Hamilton Telephone and Power Company. The East Tennessee (Bell) Telephone Company offered to continue giving service at the old rates until there should be 3,500 subscribers, but as this company has so often broken its promise the aldermen refused to accept any more promises.

CHILLICOTHE, MO.—At a recent meeting of the city council, S. J. Miller, of the Livingstone County Telephone Company presented a petition asking for a franchise to construct and operate a telephone system here. A franchise was also asked for by Charles Abell, N. D. Evans and F. S. Hudson, who said they represented $13,000 of local capital.

LAMAR, MO.—J. W. Layne, of Carthage, has been granted a local franchise for a telephone system by the city council.

AMITYVILLE, L. I., N. Y.—The village Board of Trustees have granted a Franchise to the New York & Long Island Telephone Company to construct and maintain an Independent telephone system within the corporated village limits, using underground conduits on the principal streets.

CINCINNATI, O.—Harry B. Gates, of Indianapolis, Ind., one of the organizers of the Queen City Telephone Company, recently incorporated with a capital stock of $1,000,000, with the privilege of increasing to $4,000,000, has appeared before the board of public works and asked for a franchise for a new company. The company is backed by men of wealth, and is said to be amply able to carry out anything promised by it.

NEW BALTIMORE, O.—The New Baltimore and Venus Telephone and Telegraph Company has been granted permission to erect poles and string wires on the various county roads.

SPOKANE, WASH.—The board of county commissioners has granted a franchise for twenty years to the Interstate Telephone Company of Rathdrum, Ohio. J. W. Fisher, of Spokane, is manager of the company.

PERSONAL

JOHN W. CLARKE, of Norfolk, Va., has been made manager of the Bell Telephone Company in Waycross, Ga.

SAMUEL GOLDNAMER, of Louisville, Ky., has been appointed manager of the Versailles, Ky., exchange of the Fayette Home Telephone Company. The Versailles plant is to be reconstructed and improved.

J. C. MURRAY, who for many years was associated with the Kellogg Company and later with the Stromberg-Carlson Tel. Mfg. Co., has resigned his position with the latter company to accept a position as traveling salesman for the International Telephone Manufacturing Company. Mr. Murray's many friends in the telephone field will be pleased to learn of his new connection.

COMBINATIONS

CLAYTON, IND.—The Clayton Free Telephone Association, a co-operative concern, has transferred its property to a company, of which E. J. Smith is president and Dr. D. Reynolds secretary. The new company is to keep up the lines in the town limits and furnish switching service, the party lines continuing as private property up to the corporation line. There were 150 subscribers and the business had become so large as to make it unwieldy on the co-operative plan. The new company will more than double the number of subscribers.

COLUMBIA CITY, IND.—The Whitley County Telephone Company, which was recently incorporated with a capital stock of $100,000, is a consolidation of the Home Telephone Company of Columbia City, the Larwill Telephone Company and of the South Whitley Telephone Company, of South Whitley. Money has been raised by the sale of stock to improve its three systems and extend them over eight counties.

THIBODAUX, LA.—The plant of the Thibodaux Telephone Company has been transferred to its original subscribers, in accordance with the agreement existing between the company and the subscribers. It has been agreed that the original directors be allowed to continue the operation of a plant until they have been fully reimbursed.

PARNELL, MO.—The Parnell Mutual Telephone Company and the North Mutual Telephone Company have consolidated and will be under one management. The two switchboards will be moved in the one office and work together.

COMPETITION

ELWOOD, IND.—The contest for control here between the Delaware and Madison Counties Telephone Company and the Bell Company is geting warm, with the present position favoring the Independent concern. There has been no rate cutting yet, the effort of the Independent company being to displace the Bell telephones.

ELECTIONS

HOPEDALE, ILL.—The Farmers' Telephone Company, of Hopedale, has elected the following officers: President, W. H. Mount; secretary, J. W. Henderson; treasurer, W. H. B. McCormick; directors, W. M. Mount,

THE WEEK'S MESSAGES—Concluded.

W. H. B. McCormick, H. G. Schneider and J. W. Henderson. There are 150 stockholders.

RICHMOND, IND.—The directors of the Richmond Home Telephone Company have declared a quarterly dividend of 1 per cent. on stock, payable Oct. 15. This does not include the bond interest. A. C. Lindermuth was elected president to succeed P. J. Freeman. Representatives of the United States Telephone Company were present at the meeting and agreed to build a through line from Richmond to Dayton, O., at once. This company has direct telephone connection through to the east, and when the Richmond-Dayton line is completed the Home Company will be able to give service to all points in the east. The Home Company now gives long-distance service to Louisville, Ky.

BUFFALO, N. Y.—The stockholders of the Frontier Telephone Company have elected the following directors: Charles W. Goodyear, E. C. Lufkin, Clark L. Ingram, William A. Douglas, Martin Carey, Fred R. Green, Henry H. Parsons, James M. Thomas, H. D. Kirkover, Charles B. Hill, Alvan Markle, Samuel L. Watland, Charles E. Austin, John B. Weber and John Markle.

ROCHESTER, N. Y.—John A. Driscoll, of this city, has been elected president of the newly organized Wayne-Monroe Telephone Company. The directors of the company, all of whom are residents of Wayne county, are: Lucien T. Yeomans, Albert Yeomans, of Walworth; Arthur L. Hatch, of Lincoln; C. P. Jennings, of Macedon; Dr. J. S. Brandt, Ontario Center; William A. Tummonds, Ontario; George F. Waters, of Pulteneyville, and Judson L. Transue, of Wiliamson.

COTTAGE GROVE, OREGON.—The Bohemia Telephone Company has elected the following directors: David Finn, Frank Wheeler and Frank Jordan. The company will extend and improve its service immediately.

CARNEGIE, PA.—The following directors have been elected by the stockholders of the newly incorporated Gayly Local Telephone Company: James W. Riddle, Wm. A. McCormick, J. Hays Bell, Wm. H. Scott, and Thos. A. McKensie, all of Carnegie; and Wm. A. Adams, Clarence C. Vaught, and Chester A. Scott, of Enslow.

UNDERGROUND

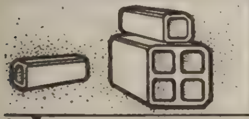
ST. CLOUD, MINN.—Superintendent of Construction Thomas J. Dwyer, of the Northwestern Telephone Company, and Foreman William Purvis, of Minneapolis, representing the Northwestern Telephone Company, are here, arranging for the construction of underground conduits for placing many of the wires of the company underground.

PITTSBURG, PA.—The city council will authorize the placing of all city wires in underground conduits alongside of the wires of the telephone companies. Bids for the work will be advertised at once.

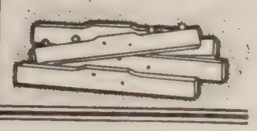
MISCELLANEOUS

CHESTERFIELD, IND.—The local telephone plant was destroyed by fire, which started by a cable coming in contact with a trolley wire. The three-story brick exchange buildling was badly damaged.

LA GRANGE, KY.—Citizens of La Grange are aroused over the action of the Cumberland Telephone Company in raising its rates, and have extended an invitation to the Home Telephone Company of Louisville to extend its service to La Grange.



New Construction in the Field



BERLIN, GERMANY.—The Russian and German Post Office Departments have arranged to construct a telephone line between Berlin and St. Petersburg, via Edtykuhnen on the German frontier and Wilna in Russia. The construction work will begin in 1904.

LINCOLN, ILL.—A new party line system is being installed by the Central Illinois Telephone & Telegraph Company, of Lincoln, made necessary by the great increase in the number of subscribers.

LINCOLN, ILL.—Dr. J. W. Collins is superintending the surveying of a new line to be built between Lincoln and Bloomington.

STREATOR, ILL.—The Independent Telephone Company, of Streator, is building a line from Streator to Cornell.

CONNERSVILLE, IND.—The Connersville Independent Telephone Company is putting in a new "central energy" system at a cost of $10,000. The system embodies all the latest improvements in telephoning, and the officials say when completed it will be an un-to-date system in every respect.

HAZLETON, IND.—The officers of the Princeton Independent Telephone Company, of Princeton, met local citizens of the town trustees recently and asked them to form an Independent telephone company to work in conjunction with the Vincennes and Princeton telephone companies.

MUNCIE, IND.—The board of directors of the Delaware and Madison Counties Telephone Company and the Gas Belt Construction Company discussed recently a proposition for the construction of a telephone exchange system of telephone lines connecting the various farmer lines in the two counties.

BOONE, IA.—The Boone Telephone Company is making arrangements to spend about $40,000 in Boone in the near future in improving its system.

COLO, IA.—The Colo Mutual Telephone Company will construct several new farmers lines in this vicinity and from Nevada.

WINFIELD, KAN.—The Winfield Telephone Company will extend the system to College Hill, and will construct a new exchange at Burden and a toll line to Atlanta. At present the company is behind about twenty-five orders.

OWENSBORO, KY.—The Rural Telephone Company is constructing a line to Rockport, Ind. At a meeting of the stockholders and directors of the Rural Home Telephone Company plans were discussed for new exchanges at West Louisville, Ensor, and Sargho.

MT. SAVAGE, MD.—The Union Mining Company, of Mount Savage, Md., is building a metallic circuit telephone line from their office at Mt. Savage to the fire clay mines on Savage Mountain.

SAULT STE MARIE, MICH.—W. H. Blake, of Cheboygan, is here for the purpose of establishing a telephone system. Mr. Blake is at the head of the new company organized to operate under the Sullivan franchcise, recently granted by the council.

ST. PAUL, MINN.—The Tri-State Telephone & Telegraph Company has purchased a lot on which it will erect a building to serve as a temporary exchange for handling this winter's toll business. Next spring a handsome fireproof building will be erected. This company is the long-distance branch of the Twin City Telephone Company.

CARTHAGE, MO.—Theodore Gary, president of the Home Telephone Company says the plans for the new local exchange building are nearly completed and that all the wires in the business section will be made full metallic. He says it is not improbable that a common battery system will be installed.

WEBB CITY, MO.—The Home Telephone Company will move its central office and reconstruct its exchange. It is also installing about 11,000 feet of cable.

SENECA, N. Y.—The Seneca-Gorham Telephone Company is planning to install a larger switchboard at Stanley.

HARTFORD, N. C.—The Elizabeth City Telephone Company, of Elizabeth City, N. C., is constructing a line to this place, and will install a central office.

KNOXDALE, PA.—J. F. Miller, of the Farmers Telephone Company has interested the farmers north of Brookville in the telephone, and has arranged to extend a line from here to Brookville, and from there to connect several subscribers whom he has obtained.

WAYNESBURG, PA.—E. B. Throckmorton of the Standard Telephone Company is endeavoring to construct a line from Rutan to Dallas, W. Va.

MARION, S. D.—The Farmers Telephone Company is constructing a line connecting Marion, Hurley and Parker. It has authorized the construction of another line to Center Point.

EL PASO, TEX.—The Mormon colonies are planning to construct a telephone line from Casas Grande station to Chuichupa, a distance of about ninety miles.

HOUSTON, TEX.—Mr. J. M. Smith, general manager of the Beaumont & Northeastern Beaumont, Beaumont & Southwestern, and Beaumont & Northwestern telephone systems, was here recently arranging to extend a line from Cleveland to Japan, thence to Humble and to Houston. A switchboard will be put in at Humble for the accommodation of those interested in the oil field.

BRADFORD, VT.—At a recent meeting of stockholders of the West Newbury & Bradford Telephone Company arrangements were made for the early building of the line.

TRADE NOTES

The Franklin Rolling Mill & Foundry Company, of Franklin, Pa., which is represented in New York City by Charles M. Mackay, Postal Telegraph Building, is after export trade in steel poles for electric power, telephone and telegraph lines. Rogers Son & Company, of London, have been appointed British agents, while Isaac M. Hutchinson, Mexico City, will look after the Mexican end.

The Farr Telephone and Construction Supply Co. of Chicago is enjoying a healthy trade from the rural districts of all the States. There is a great demand for toll line switchboards and bridging telephones, of which this company make a specialty. It reports a good trade from the electric supply houses from the different cities throughout the United States and Canada. Its catalogue will be sent free to any prospective buyers asking for it.

The International Telephone Manufacturing Co., Chicago, have just placed on the market a new mechanical restoring drop board of the express type, which seems to be meeting with universal favor. They have just delivered the first equipment to J. D. Thomas, at Paris, Missouri, which consists of a 100-drop board fully equipped and telephones. It is said that the construction of this board is simple in the extreme, while it embodies many new practical features.

W. C. Sterling & Son are still in the cedar business and in the market for calls, and solicitation of prices from any of our patrons, or anyone desirous of receiving the most attractive prices, as well as the assurance that stock will merit their future patronage. Their delivery is prompt, as they have the most central yards in Michigan as well as stock all along the line and they study their routings to insure the quickest despatch to their customers. They would like to hear from anyone contemplating the erection of new lines, or the construction of steam lines. They make a specialty of both poles and ties.

The Central Electric Company, of 264-266-268-270 Fifth avenue, Chicago, recently received a mail order for Okonite pothead wire for a large telephone cable installation in the West. The construction company ordering this wire formerly used Okonite exclusively, but during the past two years had been using cheap grades of rubber covered wire. Upon investigation it was found that the cost of making over potheads, made of cheap rubber covered wire, which was injured by the hot paraffine and other causes, amounted to much more than the cost of using Okonite originally. This the Central Electric Company regards as another strong evidence of their claim that "It never disappoints."

The Wesco Supply Company, of 7th street and Clark avenue, St. Louis, Mo., is a recently organized concern which will handle the electrical supply business which formerly was taken care of by the Western Electrical Supply Company. It (The W. E. S. Co.) in the future will handle that part of the business pertaining to railway supplies and the building of electric light plants and electric railways. Both companies will be officered by old employees of the Western Electrical Supply Company. Mr. R. V. Scudder, who grew up with the Western Electrical Supply Company, and was vice-president and general manager of that concern until two years ago, when he went into an outside line, has returned and will be manager of the Wesco Company.

The American Electric Telephone Company of Chicago, reports that it has just shipped several carloads of central energy switchboard equipment to the Ft. Worth Telephone Co., Ft. Worth, Texas. The capacity of the Ft. Worth exchange is 6,000 lines, and the apparatus is of the American's best grade. It is thought that this is the first large switchboard intended for Independent service where each cord circuit is equipped for four-party selective signaling service—the American Company's high and low frequency selective apparatus having been adopted. In addition to the Ft. Worth equipment, a 3,000-line capacity switchboard has been shipped to the Kewanee Telephone Co., Kewanee, Ill. This switchboard is also equipped complete with four-party selective keys.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

TELEPHONE SYSTEM.—Telephone System in Northwest Arkansas, 200 miles in operation, 325 subscribers, 200 miles extension needed immediately. No Competition. Excellent connections can be had with Indian Territory, Joplin, Springfield, and other Missouri points, also Little Rock, Arkansas. This line is key to the situation. Pays 15% annually, best prospects to pay 25% inside of a year. Boom in progress. Three new railroads building; also electric line and two other roads under survey. Lack of transportation has heretofore retarded the growth of the country. Good reasons for selling. Address, HERMAN H. VER MEHREN, 633 Paxton Block, Omaha, Neb. 96.

FOR SALE.—For sale telephone franchise in a good town of 28,000 population, 1,100 subscribers signed. Best opening in the Middle West. Address, Box 97, The American Telephone Journal, 116 Nassau St., New York City.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

POSITION.—Wanted, position. Have had extended experience in engineering, construction, equipment and management of Bell and Independent exchanges. Graduate electrical engineer. Address, Box 98, The American Telephone Journal, 116 Nassau St., New York City.

POSITION.—Wanted position as Superintendent or Manager of telephone company. Have had 9 years' experience in building telephone exchanges, operating and maintaining. Have just finished 200 miles of toll line and 5 exchanges. Am Superintendent of Construction for Bell Telephone Company at present; 30 years of age, and strictly temperate. Can furnish best of references. Address, P. O. Box 52, Malden, Mo. 94.

ARE YOU AMBITIOUS? Would you like to make more money than you do at present? We can tell you an easy way to do so. Write at once for full particulars. Address Box 93, care of The American Telephone Journal, 116 Nassau Street, New York City.

TO LEASE EXCHANGE.—Wanted to lease, Telephone Exchange by experienced man. Will correspond with parties having exchange with or without toll lines, with view of buying. West or Southwest preferred. Address, Box 92, The American Telephone Journal, 116 Nassau Street, New York City.

POSITION.—Position wanted by a practical expert with a company about to build or desiring to enlarge its exchange. Have machinery for manufacturing telephone appliances. Address, Box 95, The American Telephone Journal, 116 Nassau Street, New York City.

ACCOUNTANT.—Wanted, first-class acountant and bookkeeper to take charge of a large Independent Telephone Company's office and books in Pennsylvania. Address, Box 88, The American Telephone Journal, 116 Nassau St., New York City.

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau street, New York City.

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VOLUME VIII *SATURDAY, OCTOBER 24, 1903* *NUMBER 17*

THE POULSEN TELEGRAPHONE

By George M. Williamson.

VALDEMAR POULSEN, the inventor of the Telegraphone, gives a description of its theory, which was published in the *Scientific American* of Nov. 30, 1900, on which it would be difficult to improve, the inventor says: "A steel (piano) wire *A B* about 1.5 m. (5 ft.) long and 0.5 m.m. (1/50 of an inch) in diameter, is stretched on a board as shown in Fig. 1. Along it can slide the electromagnet *E*, which embraces it with one of the poles, Fig. 2. The core of the electromagnet is a piece of soft iron wire about 8 m.m. (1/3 inch) long and 0.75 m.m. in diameter, and the electromagnet itself is in series with a battery and a microphone, or is connected to an induction coil in the microphone circuit. At the beginning of an experiment the wire should be completely unmagnetized.

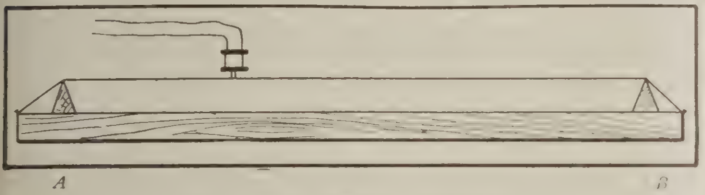


Fig. 1. The Primitive Telegraphone.

"If while the electromagnet is sliding along the wire with a velocity of about 1m. per second, the microphone is spoken into the current fluctuations produced, register themselves by means of the electromagnet on the steel wire. If now the electromagnet is connected up with a telephone and made to travel over the wire again the telephone repeats what was spoken into the microphone. Thus, owing to the great coercive strength of the steel there has been impressed on the wire, in undulations, so to speak, of magnetization, a kind of writing that is permanent and which faithfully records the articulations of the voice. When the electromagnet *E* is placed in direct connection with a moderately strong battery and is made to pass once more over the wire, the magnetic writing is obliterated under the influence of the constant magnetizing force which is great compared with the intensity of the writing magnetic forces.

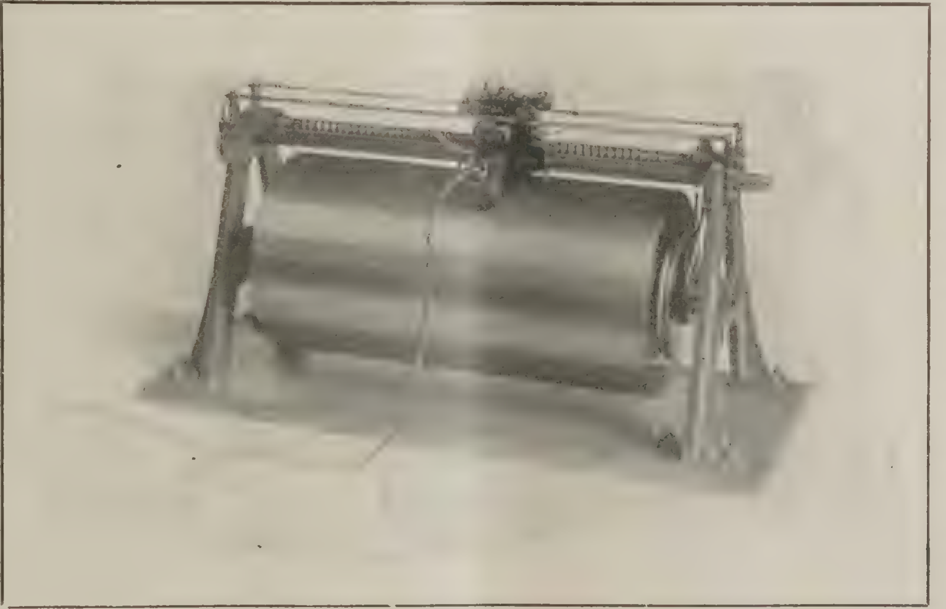
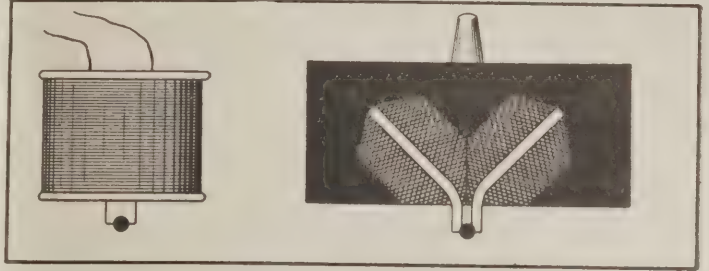


Fig. 4. Type of Telegraphone Exhibited at the Paris Exposition.

"The wire *A B* is too short to contain many words. In order to obtain a large capacity a very long piano wire is wound very firmly round a drum, having a fine spiral groove on its surface, (Fig. 4), and the piano wire follows this spiral groove. Parallel with the axis of the drum there is a rod upon which a kind of sleeve can slide. The electromagnet is fastened to the sleeve. When the apparatus is in operation, the electromagnet embraces with one of its poles, or with both, the steel wire (Fig. 3), and during the rotation this steel wire itself pushes the electromagnet and the sleeve along the road. It is very easy to handle a drum of this kind and the whole arrangement is very convenient for experiments. Of course it must be borne in mind that in the various telephonic and telegraphic applications of the telegraphonic principle there are certain conditions which must be fulfilled. The nature, dimensions and cost of the writing basis and the velocity and the construction of the electromagnet and the magnitude of the current must be considered. Most frequently in practice, the inscription of the recording on the wire is effected by means of a polarised electromagnet; but the polarisation must not be arbitrary. Let, for instance, the electromagnet, by means of which the writing is to be performed, obliterate a prior magnetic record and also simultaneously magnetise the writing basis. Then, during the inscription the electromagnet is given the polarization opposed to that which it had during the obliteration. In this way a lively movement of the moleculear magnets is obtained at the very moment of forming the writing.



Figs. 2 and 3. Telegraphone Magnets.

The susceptibility seems to increase very much in that magnetic *status nascendi,* and every shade of the writing becomes extremely perceptible. Ordinarily the polarization of the writing magnet is only a very small fraction of that of the obliterating one. The nearer its polarization approaches to the neutralization of that of the writing basis, however, the feebler may be the polarization of the obliterating magnet. The coercive force determines the degree of polarization which exactly neutralizes the magnetization of the writing basis. It is found that the writing is somewhat weak when the polarization of the electromagnet during the process of inscription is just equal to that used in the preceding obliteration. In order to polarise the electromagnet a constant current or a permanent magnet may be used.

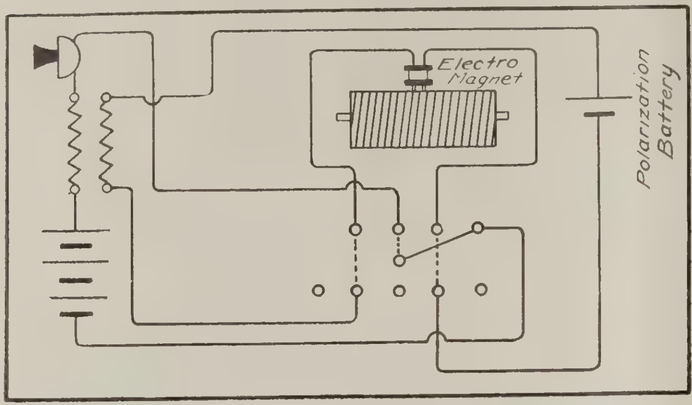


Fig. 5. Telegraphone Recording Circuit.

The writing is completely obliterated by passage through a magnetic field of sufficient strength. Ordinarily it is sufficient to let the writing basis pass the writing magnet or another small electromagnet energised by a current from two to three cells. If a speech, however, be inscribed by means of an unpolarized magnet on a writing basis already written upon, there results, as a rule, not an obliteration, but an interference.

Besides common piano wires, steel ribbons and nickel wires have been used as writing bases. The steel ribbon passes from a roll to a second receiving roll, where the layers of the roll may cover each other without the writing being destroyed. As to this last point, it has been proved by experience that the magnetism does traverse the ribbon, though, as a rule, there is sufficient air space between consecutive layers to afford nearly complete protection. With a speed of about 1 m. (3 ft.), per second, 0.154 litre (1/50 cub. ft.) of steel is needed for a speech lasting an hour. Instead of ribbon, a fine piano wire unrolling from one place to another may be used. In some cases nickel may, with good effect, be used as a writing basis, which fact is in accordance with the known properties of this metal as regards permanence for weak magnetisation. The great dependence upon mechanical influences which is characteristic of the magnetic state of nickel demands, however, careful handling of the nickel wire.

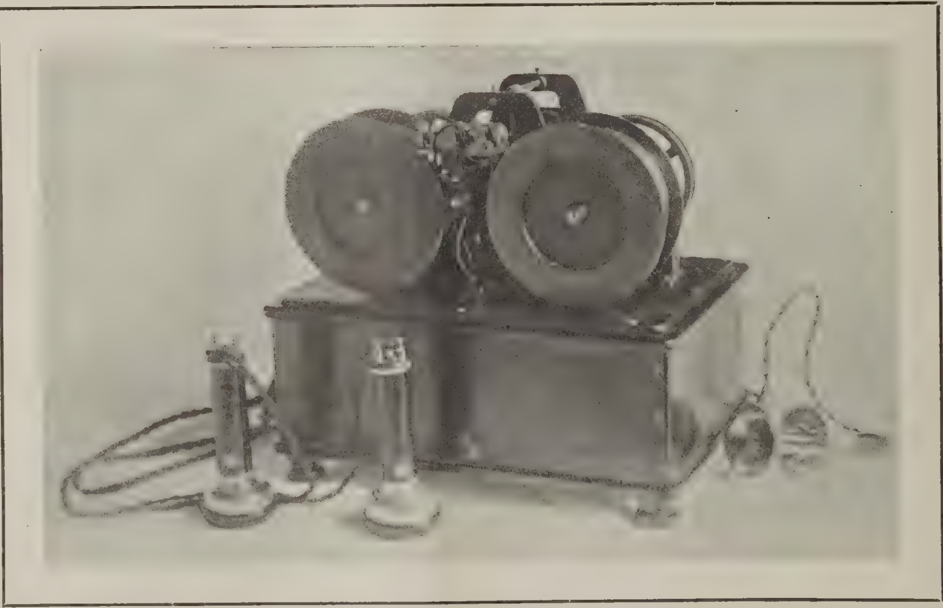


Fig. 8. Type of Telegraphone That Uses Steel Wire to Record On.

A description will now be given of the types of practical Telegraphones that have been evolved.

Fig. 4 is an illustration of the machine that was exhibited at the Paris Exposition in 1900. As will be seen, it consists of a framework carrying a brass cylinder and a magnet carrying arrangement so arranged that the magnet will always traverse a steel wire of about one millimeter diameter, which is wound upon the cylinder in the form of a helix. The arrangement is such that the pole piece of the magnet in Fig. 3, shall always, while the machine is recording or reproducing, rest upon the steel wire. This machine has a capacity of about fifty seconds duration. In Figs. 5, 6 and 7, are shown the circuit arrangements used in this type of machine when recording, reproducing and erasing, respectively. At that time having not tried smaller wire, the inventor was of the opinion that he would get no results from wire of less diameter. Since, then, however, it has been found that with a wire 1/100 of an inch in diameter, as good, if not superior results were obtained.

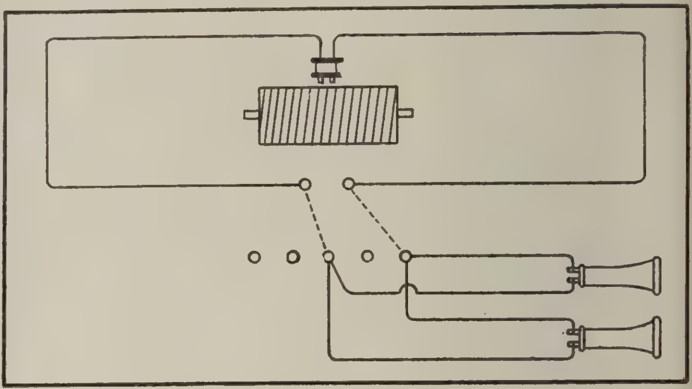


Fig. 6. Telegraphone Reproducing Circuit.

The machine illustrated in Fig. 8 was designed for the purpose of handling a small wire. This wire, of a diameter of 1/100 of an inch, immediately solved the question of capacity in the telegraphone. The machine illustrated has a capacity of 45 minutes, and of course, can be made of practically any capacity by simply arranging it to carry enough wire. The surprising thing about this small wire is the fact that this wire is wound from one spool to another, and rests in layers, similar to a thread of ordinary cotton on a spool. This curling does not in any way effect the magnetism which has been imparted to the wire. The records can be reproduced indefinitely. Individual records have been reproduced on this machine 4,800 times without showing any deterioration. The test extended over a period of eighteen days continuous running and was entirely satisfactory.

Again, as to the value of the Telegraphone as a telephone adjunct. A test has been recently recorded over a distance of 285 miles, which showed a reproduction, with a volume equivalent to such as might be expected on a local circuit. As to the description of the machine, the mechanical proposition consists simply of passing the wire from one spool to another with a velocity of about one meter a second. An electric motor or clock work may be used to furnish the necessary power. The wire weighs about a pound to the mile. The magnet arrangement in this machine is a very ingenious one, consisting of three pairs of magnets set opposite one another, as in Fig. 9. The magnets *BB′* perform the functions of recording and reproducing. These magnets have pole pieces about one millimeter in diameter, and are wound with No. 36 wire, to a combined resistance of about 100 ohms. This circuit is the telephone circuit. On the outside of this there are other coils wound upon the same spool on the top of the other winding having a very low resistance of the same wire. They perform the function of polarization. When the wire is running from right to left what happens is this: If the wire passes between the pole pieces and the magnets *C* and *C′*, any record that may be on the wire is wiped off at that point, as *C C′* are electromagnets by virtue of the current flowing through them. The new record at the same time is being recorded by the magnets *B* and *B′*, the magnets *A* and *A′* being dead. Now if the wire was running from left to right opposite conditions would take place, that is, the old record would be wiped off between the magnets *A* and *A′*. The new record would be recorded by the magnets *B* and *B′*, and the magnets *C* and *C′* would be dead.

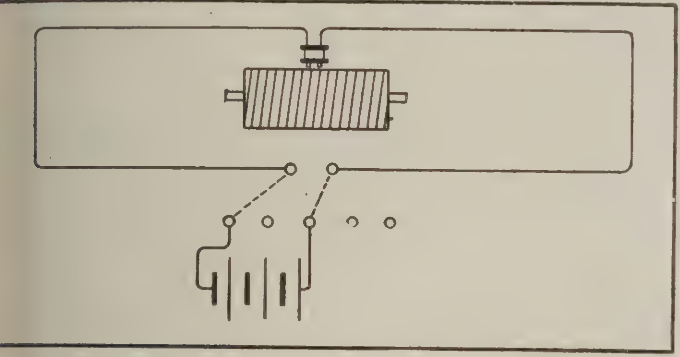


Fig. 7. Telegraphone Erasing Circuit.

It will be seen by this that the machine, by the simple action of beginning to record, instantaneously wipes off any previous record simultaneously with the making of a new record. It also shows that the machine will record running in either direction. So long as one does not attempt to make a new record, however, the old record will remain on the wire. It was found when the first experiment with these small magnets was made, that if the oppositely placed magnets, *A′*, *B′*, and *C′* were shifted so that the pole pieces were staggered, that far superior results were obtained, and it was found that this shifting and staggering of the magnets was a function of the velocity of the steel wire.

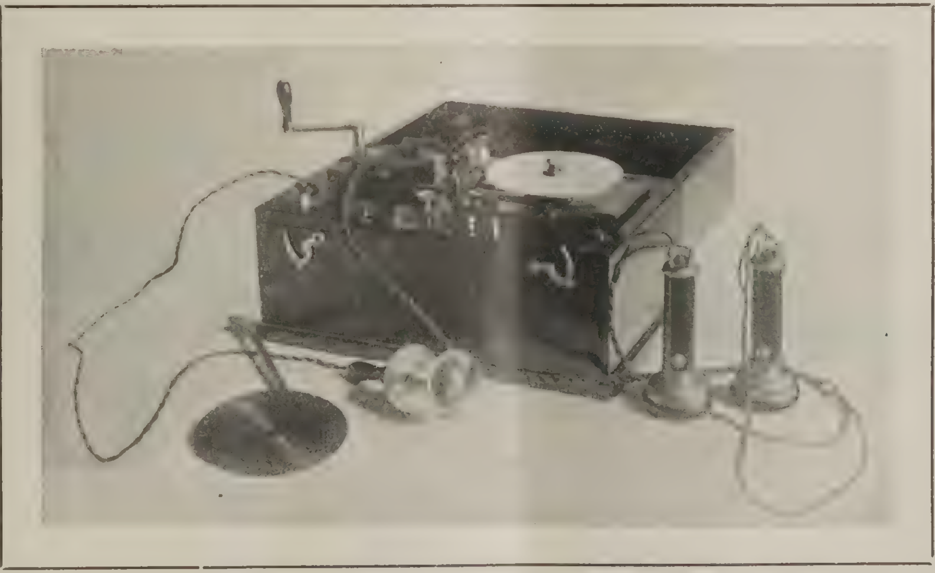


Fig. 10. Steel Disk Type of Telegraphone.

In Fig. 9 is shown the skeleton plan of the circuits employed in the type of machine shown in Fig. 8, the one that has just been described. *P B* represents polarization battery, and if assuming that we are recording with wire running from right to left, it will be seen that if we close this switch *F* to the point *M*, the current from this battery (*P B*) will pass through the coils of the magnets *C* and *C′* and through the polarization turns of the magnets *B* and *B′*. The magnets *C* and *C′* are thus energized as are the polarization coils of the magnets *B* and *B′*. Consequently, with the wire moving from right to left the conversation on the record will be wiped off by the magnets *C* and *C′*, and if the switch *G*, is now closed, we are in a position to record, this being done through the agency of the pole pieces of the magnets *B* and *B′*.

Now, if both the switches, *F* and *G* are opened, and switch *H* is closed and again the wire is caused to pass by the magnets, the record will be reproduced by means of the one-hundred-ohm coil of the magnets *B* and *B′*, and the sound will be reproduced in the receiver. These switching actions in the machine proper, are all controlled automatically by the insertion of the proper plugs. If we wish to record from left to right, by simply throwing to switchpoint *E*, it can be done.

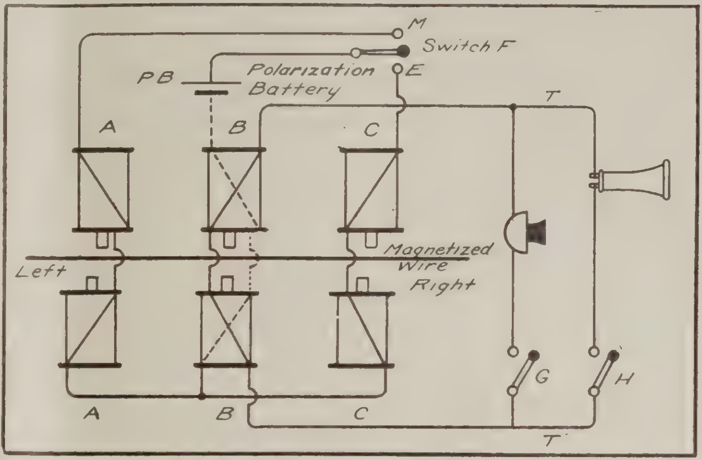


Fig. 9. Arrangement of Magnets.

Within the last few months the Telegraphone principle has been applied to surfaces. A machine for this application is illustrated in Fig. 10. The principles are exactly the same as in all the other machines, with the exception that all this work has been done with unipolar magnets with results that although not quite as loud and clear as with the bipolar magnets, still are very surprising. In this machine a disc about five inches in diameter and about 1/64 of an inch thick is made to revolve, and through the medium of a screw the magnet is fed across the surface of the disc in a spiral line, the pitch of which is about 1/80 of an inch. The capacity of the disc in time is about 2 1/12 minutes, and it has been found that with a disc as thin as 1/100 of an inch, both sides of the disc can be recorded on without any interference. The demagnetization in this machine is performed by means of a permanent magnet, which is a chisel-shaped affair. It is visible in the figure laying by the left hand corner of the Telegraphone. The machine is on exhibition in New York City.

TELEGRAPHERS' TOURNAMENT

On October 30th and 31st, in the auditorium of the National Export Exposition Building in Philadelphia, the greatest event in the history of the telegraph in this country, will take place. The primary feature of the event is the speed contests in the different branches of telegraphy. While there have been other tournaments at New York and Atlanta, Ga., neither of them have approached the Philadelphia event in scope and magnitude. It is an acknowledged fact that the operators of Europe have not developed the speed in sending and receiving which has been attained by the operators of this country. Probably this is accounted for in a measure, so far as England is particularly concerned, by the principle of promotion being dependent upon length of service rather than rapidity and efficiency. In this country the development of speed and accuracy becomes a *sine qua non,* for promotion, therefore remarkably high speed has been reached and it is expected that the coming tournament will result in the achievement of surprises.

The most important event of the tournament is the contest for the best "all-round" telegrapher in the world, for which Mr. Andrew Carnegie, last year, presented a handsome gold medal, studded with beautiful diamonds, which was donated for annual competition. This medal was won last year by Mr. F. M. McClintic, of Dallas, Texas, who attained the remarkable record-breaking speed of sending 517 words in 10 minutes, and receiving on a typewriter 500 in the same time. In these days of high speed, no prize is offered for the operator who uses the pen. It would have been impossible for Mr. Emanuel to have made such a record without a typewriter. Probably one of the most interesting features of the various contests is the "Yetman" event. The Yetman is practically the sending key and does for the sending operator that which the typewriter does for the receiver; viz: facilitates speed.

In the previous tournaments the scope of contests has been limited to press and commercial work, but on this occasion there are many new classes, embracing the different branches of telegraphy, according to the following enumeration: Prizes for high speed by the Railroad Operators, Broker Operators, and the Ladies, the "Old Timers" and the Championship Class. The "Old Timers" event is for operators over sixty years of age and it is expected that it will develop the fact that while in these days, age is a detrimental factor, some of the old operators will demonstrate that they can nearly approach the lightning records of McClintic and Emanuel.

For the public, there will be furnished an interesting feature which has never before been given. Nearly everyone is curious to know how the Atlantic and Pacific Cables are operated. Through the courtesy of the Commercial Cable Company, a "Siphon recorder," the instrument used on cables, will be connected and an exemplification given of its working. The wireless telegraph which is at present a mystery to the general public, will be one of the attractions which will be not only interesting but instructive.

METHODS OF HANDLING JACK TROUBLE

By E. D. Cracraft.

An article in a recent number of The American Telephone Journal, illustrating a method of removing the tip of a metal plug from a jack, was timely. The writer will add a few simple schemes which have been tried in the northwest and found to work well. While the tip of a plug is a villainous offender, we have found other troubles which were even harder to locate and remove.

Sometimes the conductor screws, which are usually made of brass, will find their way into a jack. Their extremely small size will admit of their movement inside the jack, and when a plug is inserted the screw may be displaced from contact and the trouble temporarily removed. If this happens when the switchboard-man is trying to locate the case he is puzzled, and if he is very busy he will pass the case for the time, only to be haunted by its frequent return and disappearance. Another common scourge are the chalks plug used to indicate changed or disconnected lines. These are usually made with a round tip connected to a straight body by a narrow neck. It is at this neck the break occurs, and as that leaves the tip about three-quarters of an inch in the jack it will not be discovered until the operator tries to plug into the jack. She will be unable to insert the plug far enough to make contact.

Matches, toothpicks, paper, etc., also add to the list of troubles, but the most obnoxious one that has to be contended with has been the carbon pencil point. Its resistance is high and it is hard to locate, and after locating it it is often broken up so badly that the jack strip has to be removed and the jack taken apart to clear it of the broken pieces of graphite. Such things as these will not be attracted by the magnet that was described in a previous issue, and a simple hook made out of a small stiff wire will do the work. If the other fellow puts the hook in his pocket and goes to lunch one can borrow a fine hairpin and remove the obstacle. To furnish light to aid in locating such a fault an ordinary line lamp attached to a six-foot switchboard cord with a plug can be used. Place the plug in an answering jack. This will bring in the line signal, but the operator will understand the reason and pay no atention to it. If the plug is placed in the multiple the signal may come in at a distant point. The operator will answer and getting no response will ring on the line. This will burn out the test lamp.

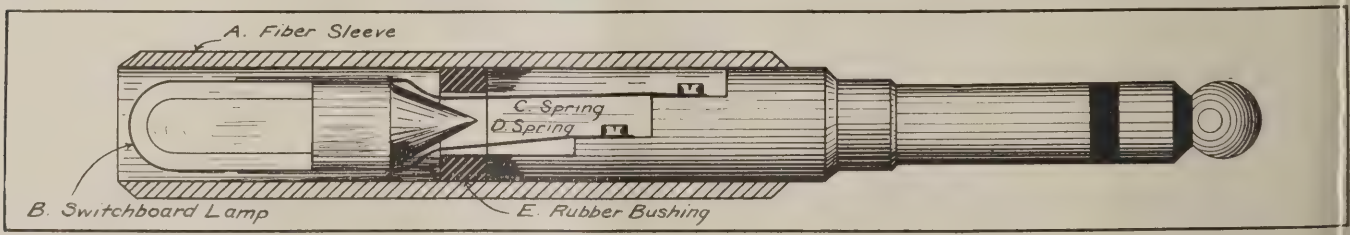


Fig. 1. Plug Equipped With a Lamp for Testing Jacks.

A reflector can be made about three-fourths of an inch in diameter and deep enough to cover the lamp, and will be found well worth the trouble and expense, for it throws the light into the jack so that very small objects can be seen. However, in the absence of a regular reflector a piece of Mauson tape can be made to answer. By these simple means as many as forty cases of plug tips and bushings, pencil points, change plugs, etc., in multiple jacks, have been removed in a single month, and that without removing a single jack strip.

Another common cause of trouble, specially in the older boards is the weakening of the springs. Unless this actually opens the line when the plug is inserted, it is hard to locate and will sometimes drift along until it is on the chronic list. Usually the subscriber will discover that certain parties cannot get him or that he cannot talk to certain other parties. The numbers of those lines with which he has difficulty will enable one to locate the offending jack. There are several methods of testing jacks. One which works very well is to use a lamp attached to the talking conductors of a regular switchboard plug. By working the plug around in the jack the lamp will indicate any make and break of the current flowing. If there is no break shown by the intermittent light of the lamp the jack is O. K. Using a receiver instead of the lamp will do, but as a very slight change of potential will cause the receiver to operate one is likely to waste time on a jack which is in very good condition. This should be avoided, as every bend tends to weaken the jack springs, and they cannot be adjusted as well from the front of the board as they were adjusted in the factory. So unless careful work is done the strip will have to be removed and new springs placed in the troublesome jack. This precaution is added, because occasions of careless work are known which caused more trouble than the original case.

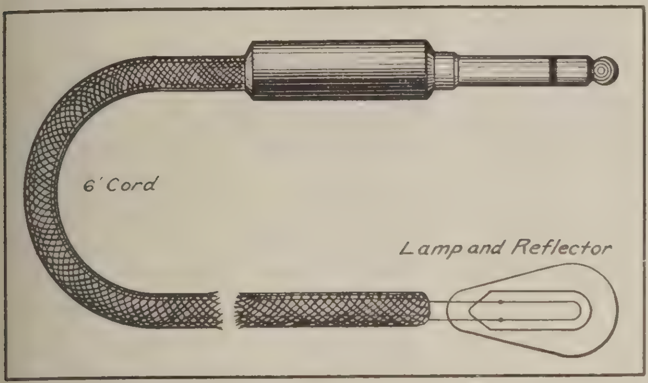


Fig. 2. Lamp Used to Inspect Jacks.

In the drawings Fig. 1 shows a plug equipped with a lamp for testing jacks. *B* is an ordinary switchboard lamp, *C* and *D* brass springs attached to the tip and ring contacts of the plug *E* is a rubber bushing to prevent contact with the sleeve, and *A* is a fiber sleeve covering the lamp and contacts. This sleeve is one taken from an enclosed fuse and bored out. Fig. 2 shows the cord and lamp used to inspect the jacks. As this will not be used a great deal, it can be arrranged quickly by simply taping the terminals of a cord around the lamp. But if one wants to go to the trouble of fixing it well a socket can be made by splitting a fiber sleeve and placing brass contact springs inside. Then the reflector is fitted over this as shown at *I*. The lamp can readily be extracted in case of a burn-out. Fig. 3 shows a very simple arrangement. Short pieces of wire are soldered to the lamp and attached to the tip and ring contacts of the plug. A wooden knob is screwed into the base of the plug and all exposed parts taped over. The possible objection to this plug is that it gives too much leverage and the user will unconsciously pry too roughly on the jack, thus doing injury. Fig. 4 is a piece of fine steel or brass wire, bent into a short hook at one end and a flat handle at the other so it can be guided while working.

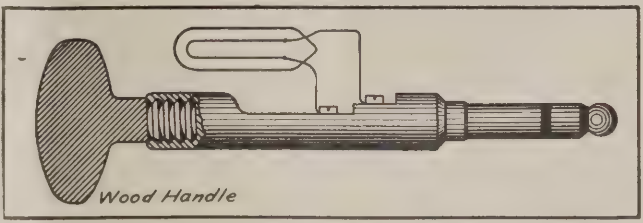


Fig. 3. Another Jack Testing Device.

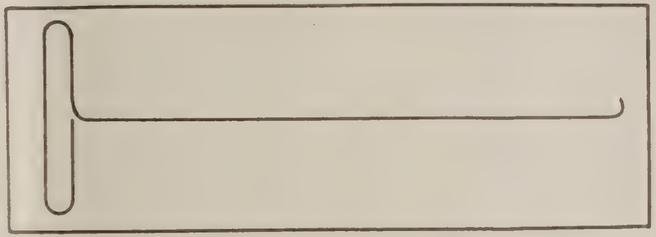


Fig. 4. Hook Used to Extract Bodies from Jacks.

THE EVERETT-MOORE EXTENSION

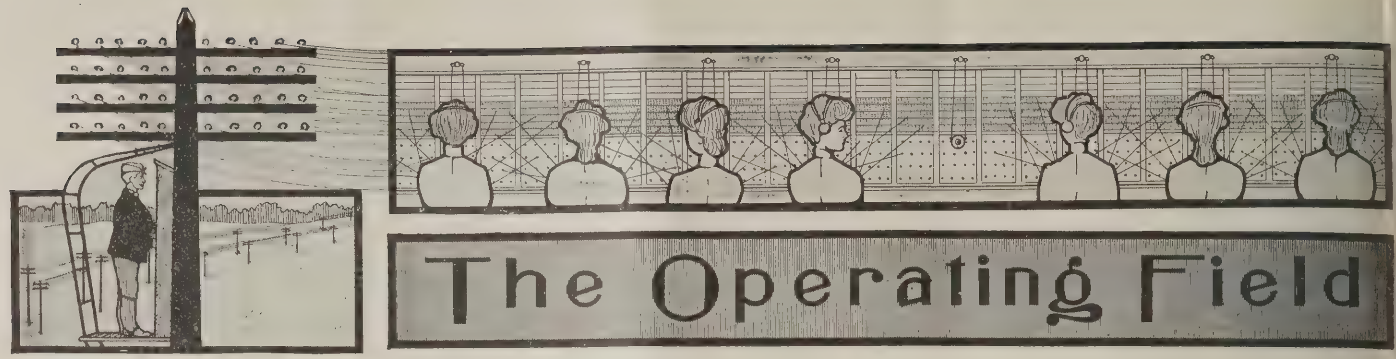
At the recent meeting of the creditors of the Federal Telephone Company, which was held in Cleveland, Ohio, they agreed to extend the time for the payment of their claims for eighteen months. This will bring matters up to April 1, 1905. No creditor raised any objection to the plan and all agreed to sign the extension. Mr. H. R. Newcomb, Henry Everett and F. S. Dickson, called the meeting. It was stated by Mr. Dickson that one creditor had secured judgment and threatened execution and others had signified their intention to sue. In order that the interests of all might be protected, it was thought best to call the meeting. The syndicate, it is stated, is ready to do anything the creditors desired but would like to have an extension.

During the past eighteen months it has been stated, the syndicate liquidated $12,000,000 of its indebtedness and has put $2,000,000 of new money into its new properties. It now owes in the neighborhood of $4,500,000, of which the Federal Telephone Company owes about $3,000,000 having reduced its debt from $4,200,000 by the exchange of securities and the sale of plants. Of the indebtedness of the Federal, about $1,800,000 is due to outside parties and companies. The remainder is owed to the various members of the Everett-Moore syndicate. The extension means that the affairs of the Federal Telephone Company are in good shape for settlement for eighteen months. The agreement is a much better one than that secured at the beginning of the Everett-Moore troubles, for the reason that under that agreement any creditor might have put the telephone company in the hands of a receiver at any time during the two years past.

H. R. Newcomb, Henry Everett and F. S. Dickson, constituted the committee appointed to represent the creditors and continue the liquidation and settlement of the Federal affairs. This committee supersedes the famous bankers' committee appointed at the beginning of the Everett-Moore troubles, and the escrow fund now in the hands of the bankers' committee will be transferred to this committee. The agreement carries the company over the presidential year, when it is predicted that there will be little trouble in marketing the securities which would have to be sold at a sacrifice at the present time.

NEW EXCHANGE BUILDING FOR P. & A.

The Pittsburg and Allegheny Telephone Company has awarded the contract for the erection of the new central building at McKeesport to Mr. Charles Reif, Jr., of Allegheny. The contract price is $18,500, and the building is to be completed by December 15. McClure & Spahr were the architects. The subway work is about finished and most of the poles have been set. The Standard Underground Cable Company has the contract for the cable, which aggregates $50,000 and amounts to about 20 miles. It is one of the largest cables in the state of Pennsylvania, embodying about 800 separate and distinct wires. The cost of the subway will aggregate about as much as that of the cost of the cable.



The Operating Field

SOUTHERN INDIANA ASSOCIATION.

A LOCAL committee is making elaborate arrangements for the holding of the annual convention of the Southern Indiana Independent Telephone Association in Evansville, November 11. An interesting program has been prepared for the morning and afternoon sessions. The members will be banqueted at night. Charles D. Knoefel, of New Albany, is vice-president of the Association and is doing much to make the coming meeting a success. Mr. Knoefel says the New Albany Independent company has cable connections with the Independent system in Louisville, and by means of these two systems long-distance connections can be made between the towns in southern Indiana and Kentucky. Mr. Knoelfel says the membership of the Southern Indiana Association will be greatly increased at this session, as numerous systems will be represented that have not heretofore identified themselves with the society.

THE KENTUCKY ASSOCIATION CONVENTION.

ON Oct. 13th, the Kentucky Independent Telephone Association met in Paris, Ky. Representatives from the leading telephone companies in the state were present. Among the companies represented are the Louisville Home Telephone Company, the Independent Long Distance Telephone Company, the Fayette Home Telephone Company, the Clark County Telephone Company, the Mt. Sterling, Maysville, Lancaster, Nicholasville, Cynthiana and Paris companies.

Among the men present were D. L. Pendleton, president of the association, from Winchester; James Maret, Mt. Vernon; R. V. Bishop, Cynthia; David Prewitt, Winchester; E. M. Coleman, Louisville; Henley V. Bastin, Lancaster; James S. Brailey, Toledo, O.; John T. Hinton, Buckner Woodford and Quincey Ward, Paris; George S. Shanklin, L. G. Cox, and Desha Breckenridge, Lexington; Benjamin Buckner, Winchester.

The officers for the ensuing year were elected and are: President, D. L. Pendleton, Winchester; vice-president, John T. Hinton, Paris; secretary, James Maret, Mt. Vernon; executive committee: David Prewitt, Winchester; George S. Shanklin, Lexington; J. L. Mitchell, Maysville.

INDIANA MEN INVADE OHIO.

By R. D. Fisher, *Special Correspondent.*

HARRY B. GALIS, of Indianapolis, George W. Biers, of Ft. Wayne, together with Max Selbert and others of Ohio, have organized and incorporated the Queen City Telephone Company, with a capital of $1,000,000. The declared purpose of the corporation is to secure a franchise and operate a telephone system in Cincinnati, O. The Hamilton County Construction Company has been incorporated by the same parties, as an allied institution, and for the purpose of constructing the system. While the prime movers in both companies are Meyers, Galis and Beers, a number of Ohio men are connected with the scheme and make up the directorate of both companies. The promoters are proposing to the citizens of Cincinnati, in case a franchise is granted them, to construct a system to cost at least $4,000,000 and promises a rate not to exceed $72 per year for unlimited service. The new company promises to connect with small systems in the various cities and towns of Ohio, Indiana, Kentucky and neighboring states. Although there is no means of finding out, it is generally believed that the United States Telephone Company is backing the scheme of the Indiana men.

SWITCHING AGREEMENT OF THE KAMRAR CO.

ALL grievances of the owners of the rural telephone lines running out of Kamrar, Iowa, with the E. H. Martin company, of Webster City, have been settled. A mass meeting of the rural patrons was held in Kamrar which was attended by Mr. Martin. The differences between the companies were discussed and settled in a manner satisfactory to both. The difficulty lay over the toll business and the rates charged. The Martin company charged the rural patrons 20 cents for connections with its lines, as is usual with all companies, and the farmers believed that they too should charge this amount for the use of their lines. The farmer lines are mutual affairs.

The difficulty as finally settled, leaves the Martin company the right to make its former toll charge of 20 cents, while the rural company is free to make a charge of 10 cents for switching except that in case the call is made by someone not a patron of the Martin company, the rural company will make the regular charge of 20 cents. Hence patrons of the Martin lines can now get connections with the Kamrar rural lines for 30 cents, while outsiders will be charged 40 cents. By the settlement the rates made are such as are usually charged over the state. It is always customary for rural companies to make a 10-cent charge for switching a call.

The Martin Telephone company of this city has just completed an extension of their line from here to Flugstad, and are now at work running it to Homer.

INDIANA ELECTRICAL ASSOCIATION ENLARGES ITS SCOPE.

AT a recent annual meeting of the Indiana Electrical Association at Indianapolis, it was voted to enlarge its scope so as to make men engaged in the telegraph and telephone business eligible to membership. Heretofore the membership was confined to electric light men. The name of the association was changed to that of the Indiana Public Utilities Association. New officers elected for the ensuing year are: J. H. Harding, Laporte, president; vice-president, H. D. Haring, Indianapolis; secretary-treasurer, A. M. Barron, Indianapolis.

TELEPHONE MEETING AT LA GRANGE, MO.

By W. H. Elges, *Special Correspondent.*

A MEETING was held recently of the Farmers' Telephone Association of Missouri, for the purpose of deciding whether or not it should consolidate with the Citizens' Telephone Co., of North Missouri. Also to discuss other business. A committee of three was appointed to meet with a committee of the Citizens' Telephone Company of North Missouri. The committee consists of J. F. Cunse, Wm. H. Solter and E. F. Westhoff. Also one representative from each line was appointed. The meeting was held at the county seat, Oct. 19, 1903. Mr. Wolfmeyer was appointed for the Wyaconda Telephone Co.; H. Spilker for the Lindale Telephone Co. No. 2.; J. C. Ammerman for the Prairie Telephone Co.

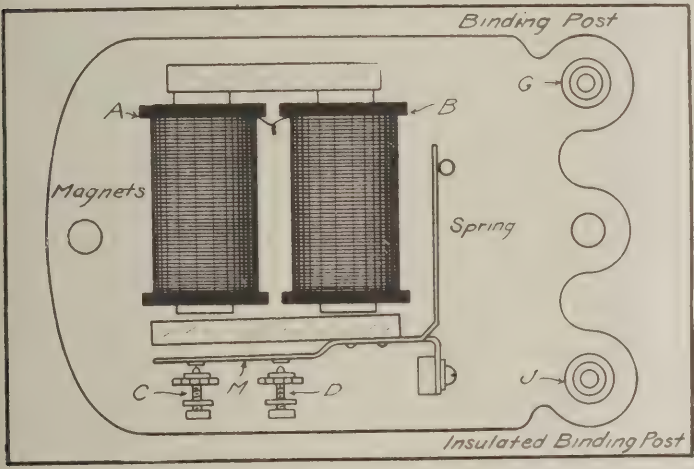
The companies represented at the county seat were as follows: Of the Farmers' Telephone Association, Lindale Telephone Co. No. 1.; Lindale Telephone Co. No. 2.; Highland Telephone Co.; Wyaconda Telephone Co.; Bozarth Telephone Co.; Prairie Telephone Co.; Canton and La Grange Telephone Co. Of the Citizens' Telephone Co. of North Mo.: Cox Telephone Co.; Garkie Telephone Co.; Guseman Telephone Co.; Wyaconda and Williamstown Telephone Co.; Burgess Telephone Co.; Steward and McClain Telephone Co.; Williamstown and Pleasant Hill Telephone Co.

HOME PLANT AT LONG BEACH, CAL.

LONG BEACH, Cal., now has its Independent telephone plant. The Home Telephone company has commenced business. The new company starts out with about one hundred telephones, although the subscription list numbers about three hundred and fifty. The work of connecting these subscribers is being pushed and it is thought that within two weeks the majority of them will be connected. Work on the toll line to Los Angeles is progressing rapidly, and it is thought another week will see Long Beach connected with Los Angeles.

CHEAP VIBRATOR FOR AN INDUCTION COIL.

RECENTLY I noticed an electrical experiment, headed, "How to Make a Large Induction Coil;" as I already had an induction coil, all I needed was a vibrator, which I made as follows: I procured an electric buzzer and fitted it up as shown in the drawing. *D* is an extra post similar to *C*, fastened in the same manner. Connect *C* to the end of magnet at *A*, then connect *B*, the other end of the magnet, to the post *D*. Connect the post *D* to the binding post *J*. The posts, *C*. *D* and *J*, must be carefully insulated; if not a short circuit will result. The screw in post *D* should not touch the core spring *M*, when the bell it at rest, but should be screwed up to about 1/12 inch from contact, so that the vibrator will strike it. It is very easily made, as I made mine in about half an hour.—*Popular Mechanics.*



SOME "TELEPHONE GIRL" ADVERTISING.

A NOVEL advertising scheme has been set on foot in Jackson, Tenn. The old "Casino" success, "The Telephone Girl," is to appear at the local opera house. Twelve of the operators of the telephone exchange have been invited to occupy box seats at the theatre the evening of the performance. The invitation was extended by a local enterprising young photographer named Moore, who addressed a letter to the manager of the "Telephone Girl" company in which he (the photographer) said that in appreciation of the excellent service received by him at the hands of the operators, and in acknowledgement of the hearty support accorded him by the "Home Telephone Co." (several of the operators have patronized his studio since he came to Jackson, about a month ago), as an expression of his appreciation of these, he wished to invite the operators to witness the "Telephone Girl." The manager of the company, Mr. Smith, answered his letter by one which he had published in the daily papers, together with the letter of the photographer, inviting the young ladies. In Mr. Smith's letter acknowledging and accepting the invitation in behalf of the operators, he throws bouquets at the photographer, just as Moore threw them at the telephone company.

The public is invited to visit the Home Telephone exchange from 2 till 4 P. M. on the day of the show, so that persons who never saw the workings of a telephone exchange may have an opportunity to do so in order that they may better understand the significance of the characters in the operetta. The management of the theatre has made liberal concessions to the manager of the telephone company in the matter of complimentaries, realizing the value of the advertising which the play will receive. The comedian of the company, Hans Nichs, who plays the part of wire chief, is to be requested to allude to the presence of the operators by some joke invented for the occasion and also to say a good word for the photographer, in joke form. Local interest has been aroused, and the house will undoubtedly be packed.

BALD MOUNT, PA., COMPANY BUILDS.

FIFTEEN miles of metallic circuit trunk line has recently been built by the Newton, Ransom & Lake Winola Telephone Company, of Bald Mount, Pa., a part of which is of heavy copper wire. It has entered into a traffic agreement with the Tunkhannock and Wyoming Valley Telephone Company, the two systems being connected at Falls, Wyoming county, Pa. This company was incorporated over three years ago, constructing at that time 40 miles of grounded circuit lines and installing 65 series telephones. It has been successfully operated as a local. The directors feeling the need of being in touch with the outside world, have made this arrangement, by which its subscribers will have long-distance service. The officers are: O. Van Buskirk, president; D. C. Vosburg, vice-president; W. E. Thompson, secretary; C. V. Decker, treasurer, and F. C. Thompson, manager.

THREE NEW EXCHANGES IN MICHIGAN.

TELEPHONE exchanges have been opened by the Co-operative Telephone Company of Michigan, at Elm, Stark and Nuremburg, three villages in Wayne County, which have been without telephone service. The company is able to give service to Trenton by making a roundabout circuit of over 200 miles through Lansing. President Burton, of the Co-operative Company, has recently been engaged in collecting statistics on telephone rates from various large cities and will probably turn them over to the board of commerce or council committee on franchises. Mr. Burton states that the figures show that Detroit is giving the lowest rate of any city of importance in the United States.

TELEPHONE NUMBER AN ASSET.

A TELEPHONE number is an asset belonging to the party in whose place of business the telephone is located, according to a decision of Judge Dillon, of Columbus, Ohio. The question arose in the case of Thoman & Stump vs. D. D. Tresenrider. The complainants bought the defendant's grocery and claimed the right to keep the telephone number that had been used by the grocery. The defendant was going into other business and wished to take his old number with him. The telephone company was about to permit him to do so when Thoman & Stump secured an injunction restraining Tresenrider and the telephone company from making the transfer. The telephone company asserted that they could not be enjoined because they were not a party to the sale of the store. The judge, however, held the telephone number to be an asset that was transferred at the time the grocery was sold, and made the injunction permanent.

OBJECTED TO TELEPHONE POLES.

ONE Maine woman does not want to see any more telephone poles erected in her town. In arguing the case with a neighbor the other day, she said: "I hope the city council will put a stop to this settin' up poles. My husband pays a three-dollar pole tax already, and that's enough."

The Editor's Page

THE BELL'S RIDICULOUS CLAIMS.

THE interesting and active press bureau maintained by the Bell telephone interests is still industriously circulating reports and insinuations intended to discredit the Independent telephone movement and to frighten capital from the field. The animus of these reports is very evident to those who are watching the course of events from the inner circle, so to speak. But there is some danger, perhaps, that to the uninitiated they may pass as gospel truth. The purchase of the Kellogg Switchboard and supply Company is referred to with great gusto and the transaction is mentioned in inspired statements as clinching the hold which the Bell Telephone Company is supposed to have upon the field of operation. It would be inferred from these reports that the purchase and control of this Kellogg concern was the one thing needful to maintain the monopoly so long enjoyed by the Bell interests.

Naturally, nothing is said of the shameful method used to gain control of the Kellogg company. Why should it be mentioned? "All is fair in war," and business conducted along modern lines often suggests General Sherman's famous description of war, even if it cannot be described as war itself. Still, these methods have been something of a shock to people who have ethical ideals, and they have been pretty thoroughly exposed by THE AMERICAN TELEPHONE JOURNAL during the past few months. "No matter by what means we acquired the Kellogg interests," the Bell people say in effect, "we have acquired them. They are ours, body and soul. The Bell company controls the Kellogg concern absolutely and by so doing controls the source of supply to which all Independent companies turn for their equipment."

The absurdity of this claim has often been pointed out by us, but it will bear repeating and emphasizing. The Bell people have very elaborately, and at great expense, set a trap for the Independent operator to walk into. The only thing now needed to make their victory complete is to have the Independent operator walk into it, something which he is not doing to any alarming extent and does not propose to do. Just why the Bell people should not give the Independent operator credit for at least a fair share of business acumen does not appear. Every movement of the Bell company is evident, yet, ostrich-like, it hides its head in the sand and fondly hugs the delusion that its motives are entirely concealed.

It is idle to suppose that the Independent companies will forego any of the advantages which they have at such effort and cost gained and will play into the hands of their old-time opponents. Too much is at stake. To treat with the Bell people or any adjunct in any manner, however remote, certainly is a step backward and means an abandonment of a position to gain which has cost a long struggle.

WILL THE INDEPENDENTS BE TRAPPED.

To successfully engage and compete with the Bell interests, entrenched as they were behind years of monopoly and unlimited capital, has been no small matter. The pioneers in Independent telephone construction had courage and persistence. Capitalists were slow to believe this could be done. The public was slow to see the advantages which would arise from competition. At that time the press bureau of the Bell company was busily engaged in showing the great benefits to be derived from a telephone monopoly and exploiting the inconvenience and utter undesirability of a competing telephone system. Notwithstanding this the Independent operator went valiantly forward, enlisting capital and enlisting the public. He not only satisfactorily covered Independent fields, but he invaded those fields long considered sacred to monopoly. Both capital and the public were decidedly the gainers; the people, for they speedily secured practically double the service at half the price, and capital, because the Independent companies wherever rightly managed have paid good dividends and proved an inviting form of investment. As we have before pointed out, the Independent movement has grown in a few years to such an extent that the Independent instruments in actual use already outnumber those of the Bell instruments by at least three-quarters of a million, and the disparity is growing greater every day.

In view of these facts it certainly seems nonsensical to suppose for a minute that capitalists or the Independent operators will permit themselves to be frightened from such a hard won field. The suggestion so artfully put forward, that with the acquirement of the Kellogg company, the Bell Telephone Company is now in a position to collect royalty for every Independent instrument in use is so absurd that it deserves only laughter.

Not only is this claim absurd, but the Bell people, by their own unholy and frantic zeal have given the Independent operators an opportunity of dealing them a body blow. By simply refusing to have anything to do with the Kellogg company the Independents can utterly demoralize the enemy. The Kellogg concern was already in a precarious condition when acquired by the Bell interests at so great an expense. If now the Independent operators let it severely alone, refuse absolutely to have anything to do with a Bell adjunct of any description and of whatever antecedents, no matter under what disguise it may be operating, the great expense will have gone for naught. The Kellogg Company will join the procession of Bell bankrupt concerns.

FOREIGN CURRENTS

By "The Arrester."

MUNICIPAL telephony is on the top of the wave just now in Great Britain. Rather a stormy wave it is, and it would be hard to say just now whether the wave is going to burst and collapse, to turn into breakers, as some waves do, or to roll majestically on, gathering force and volume as do other waves. It somewhat depends on the rocks, and the municipal telephone wave seems to have encountered several rocks of late that have thrown up no little spray. One "inquiry" follows another, and at each inquiry the plans and estimates on which municipal telephony is founded come in for most outspoken and drastic criticism. We recently gave some notes regarding the inquiry held into the proposed municipal telephone system in Hull, where it was pointed out that the system of working proposed, was obsolete, and that both the capital cost and the working expenses were under-estimated. A similar battle of expert opinion was waged last month at Portsmouth, where an inquiry was held into the proposal to raise an additional loan of $60,000 to extend the municipal telephone system recently inaugurated in that historic town.

Another Inquiry

IT appears from the very condensed accounts of this inquiry published in the technical papers, that the Portsmouth municipality borrowed, a year or so ago, $125,000, wherewith to build a telephone system for some 1,200 subscribers. This system was inaugurated in June last, with much local rejoicing, but in May the original capital had all been spent and it became necessary to borrow more. Meantime, the work was carried on by means of money obtained in advance of the official sanction of the loan. As at Hull, Mr. A. R. Bennett was the expert in charge of the scheme, and spoke in defense of his plans and estimates, and Mr. Herbert Laws Webb and Mr. T. E. Kingsbury, were the experts called by the opposition, to expose the weak points of the said plans and estimates. With some differences the argument took much the same course as at Hull. The differences were chiefly due to there being an actual working system to discuss, and in the discussion of the results so far achieved, it came out that the estimate had only been justified by the expedient of omitting to build a number of long local trunk lines to outlying places provided for in the estimate, and by counting extension stations as subscribers' lines.

Municipal Difficulties

IT is quite evident that even if the British municipal telephone systems were based on the soundest and most invulnerable principle, both technically and financially, they would still labor under very great difficulties, that are altogether absent from telephone competition in this country. To begin with, from what we have gathered from the various notes and articles that have appeared on the subject, they have to pay the Government royalty of ten per cent. on the gross receipts and they have to pay in interest and sinking fund on the capital an amount equivalent to what would be considered a fair dividend for a company—six or six and a half per cent. So it is no wonder that depreciation is barked when a special effort is being made to offer a low rate. Then again the municipalities have to make all their business public and expose their plans, estimates and accounts to expert criticism. A company does not have to do this; if it is in difficulties it can "lay low" as long as it can keep out of a receiver's hands, and in any case, it does not have to spread all its affairs on a public record. The British municipality does. A public enquiry has to be held on every proposal to borrow money on the credit of the municipality. This would be all right with a sound scheme, but the municipal telephone schemes that have so far been put forward in Great Britain are evidently fairly open to criticism on the grounds of technical inferiority and general incompleteness.

Lines and Lines

THE original estimate provided for 1,200 lines at $90 apiece, or thereabouts. Some of these lines were to be in Portsmouth, and some in five or six neighboring places, forming a natural part of the territory which had to be reached by trunk lines. When it came to what had actually been done for the money, it was admitted that many of these long trunks had not been built at all, and that although about 1,200 instruments had been connected, a large proportion of these were simple extension instruments attached either to inside or outside lines and did not represent the kind of line referred to in the estimate. Mr. Webb criticized the method of working adopted—the "ring-through" system—and stated that the relay system was now the standard system of working, which by its many advantages, simply imposed itself on an up-to-date telephone concern. He also said that the municipal estimates did not allow sufficient margin for spare or surplus plant and were pitched on too low a scale to admit of sound work being done. He pointed out that an instance could be seen of this in the streets of Portsmouth at the time.

"Surface" Conduits

THIS object lesson in municipal methods of telephone construction was a cast iron duct being laid in a street in process of repairing. The duct was being laid in a furrow in the part of the roadway excavated to receive the foundation of the asphalt pavement, and was placed so that the upper side of the duct would be within six or eight inches of the surface of the pavement. The Inspector said that such work would not meet the requirements of the Local Government Board, and the newspaper accounts state that the Inspector visited the scene of the work after the inquiry and found the conditions as described. The other criticisms made of the scheme were that the operating expenses had been under-estimated and that in view of the competition the municipal system had to meet and of the cutting of rates the estimated revenue on which the finances of the system were based would not be obtained. This latter point was verified during the proceedings, as it came out that the actual revenue per subscriber was only $21, whereas the estimated revenue counted upon to produce a balance sheet with a margin on the right side had been about $27. Mr. Kingsbury expressed a disbelief in municipal telephone methods as broad and as deep as that of Mr. Webb, and pointed out specially that the question of depreciation, so important in telephony, did not receive adequate recognition in municipal telephone estimates.

TO RESTORE OVEREXPOSED BLUE PRINTS.

OVEREXPOSED blue prints can in many cases, be restored by immersing them in a bath of weak ammonia, using about two spoonfuls of ammonia to a tumblerful of water. This will cause the print to turn first purple then pink and after a time nearly white. When it has reached the pink stage rinse it and immerse in a bath composed of one teaspoonful of hydrochloric acid in one tumblerful of water. The blue color will then return much brighter than before, but this time the lines will be white and clear. Wash thoroughly before drying.—*Popular Mechanics.*

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

TELEPHONE POLES ADDITIONAL BURDEN IN OHIO.

"We wish to place a pole and anchor in front of a residence lot. The property owner refuses permission on account of looks, as it in no way interferes with his geting in or out of lot or in any other way. We have a franchise which gives us the usual privileges, such as setting poles, guys, etc., provided they do not interfere with travel or traffic. Are we liable for damages if we place such pole and anchor without permission? This query comes from Ohio. C. L. H."

According to the rulings of the Supreme Court of Ohio, you would be liable in damages for erecting a pole and anchor in front of a person's lot without that person's permission to do so. The abutting owner as well as the public has rights in the streets. Your franchise gives you merely the permission of the public; the permission of the lot owner must also be obtained. This is aside from the question of interfering with his access to his property. Said Justice Woodbury, in Smith vs. Central District Printing & Telegraph Co., 2 Ohio Cir. Ct. R. 259, 2 Am. Elec. Cas. 237, 256, "While the public may authorize the erection of telegraph or telephone poles along and upon the sides of a highway so as not to interfere with the public use * * * that does not authorize their construction as against the adjoining lot or land owners; * * * such erections and constructions are an additional burden upon the fee of the land, which must be first appropriated or acquired by contract before they may be taken." See also Dailey vs. State, 5 Ohio 348, 5 Am. Elec. Cas. 187 Joy and Joyce on Electric law, Sec. 304. The above applies only to the law in the State of Ohio; some states hold differently.

TRIMMING TREES AND OTHER MISSOURI QUESTIONS.

"If the city council gives us the privilege of building our lines along the side of a certain street, and that street is lined with trees, do we then have the right to cut the branches of those trees out of the way of our wires? Our company is incorporated under the laws of Missouri.

"(2). Will the city council be compelled to grant us a franchise if we apply for it and offer to pay for it what the company now operating in the city is paying? Our lines thus far are rural. The city has a population of about 2,000.

"(3). If we use grounded circuits, how far will we have to keep away from the other company's lines? W. S. J."

Under the decisions of the Missouri courts, you cannot cut the branches of shade tree that line the streets without permission of the owners unless you respond in damages for your act. In the case of McAntire vs. Joplin Teleph. Co., 75 Mo. App. 535, 1 Mo. App. Repr. 420, it was held that where the title of the abutting owner extends to the center of the street, he may, under the constitutional provision that private property shall not be taken or damaged without just compensation, recover damages for the cutting of the limbs and tops of shade trees in front of his property by a telephone company. This is true although your franchise permits you to use the side of the streets and no unnecessary damage is done. Bronson vs. Albion Teleph. Co., (Neb.), 60 L. R. A. 426. Joyce on Electric Law, Sec. 390. If the title of the street is in the city and the trees you wish to trim stand in the street, your franchise would be a protection.

(2.) The council can grant or refuse a franchise at its own discretion or caprice. A franchise is a contract betwen the municipal corporation and the telephone company and the city can no more be compelled to grant a franchise than you can be compelled to make a contract for the purchase of supplies. This is true unless there is a statute of the State or a provision in the act under which the city is incorporated, expressly making it the duty of the council to grant franchises to all telephone companies that apply for them.

(3.) You will have to keep far enough away from the other company so as not to interfere with its lines. What that distance actually is will depend upon the circumstances of the case. It is a question of telephone construction and not of law.

JOHNSTOWN BUSINESS TAX VALID.

The Superior Court of Pennsylvania has sustained the decision of Judge O'Connor in the suit of the City of Johnstown vs. the Central District Printing & Telegraph Company. The latter company is in effect the Bell Telephone Company. The city brought suit to compel the company to pay the regular city business tax of $100 per annum. The company resisted on the ground that it was engaged in interstate commerce and therefore could not be taxed by the municipality for the privilege of doing business. Its claim was based on the fact that they did business over lines running from Pennsylvania into other states. The clause under which the tax was levied did not specify that the tax was levied on only the local business of telephone companies, but as the city council has jurisdiction only over matters concerning the municipality, it was contended that the intent to confine it to a tax on local business was evident. The decision of the Cambria County Court, which has now been sustained, was in favor of the city.

ERECTION OF POLES ON GOVERNMENT PROPERTY ENJOINED.

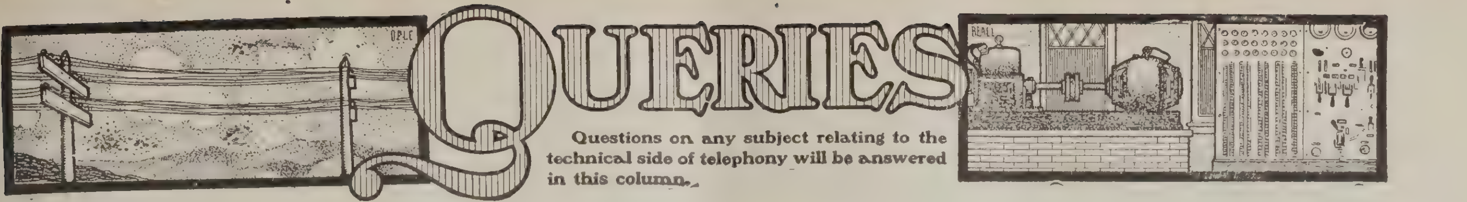
At Greenboro, N. C., United States Judge Boyd issued a peremptory and perpetual injunction against the Bell Telephone Company, prohibiting it from placing poles in certain large holes it had cut through the concrete pavement fronting the government building. In addition to this the Federal grand jury has returned an indictment against the company's local superintendent of construction, and the Bell company itself for damaging government property. The company claimed that it had the authority of the supervising architect to place the poles and thought that this was sufficient, but the court held otherwise.

A COMPROMISE VERDICT.

The case of Alonzo Gore vs. the Southern Bell Telephone, brought for $50,000 damages received from coming in contact with two live wires in Marietta, Ga., resulted in a compromise and a consent verdict. Plaintiff alleged that after coming in contact with the wires he could not be released until machinery at the plant was stopped.

STEPPED INTO AN UNGUARDED HOLE.

Bertha M. Roller has recovered a verdict of $1,000 against the Keystone Telephone Company at Philadelphia. Her suit grew out of an accident in March, 1902, when she stepped into an unguarded hole dug by the company, and sustained a permanent injury to her back.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

CURRENT OR STATIC INDUCTION.—(217.)

What is the difference between static and current induction? C. I. O.

Where noise is caused in a telephone receiver by static induction it is caused by charges of positive and negative electricity flowing through the receiver to neutralize each other. For instance, suppose in Fig. 217, *A B* to be a disturbing wire carrying a current which would charge it positively as indicated. Then a negative charge would be induced on the nearest telephone wire and a positive charge on the distant telephone wire as shown by the signs in the drawing. Now, if the current in *A B* changed in sign a positive charge would be induced on *e f*, and a negative charge on *c d*. Obviously there would be a flow of current through each receiver R_1 and R_2, as the charges flowed around to neutralize each other. Each of the charges on the line wires would divide at the point X and X^1 and flow through the receiver, making in them a noise. If receivers were inserted at X and X^1, they would emit no sound, as there is no flow of current past X and X^1.

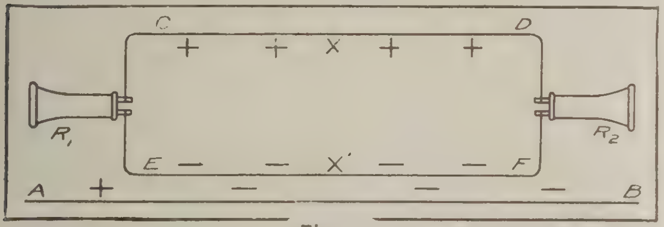


Fig. 217.

Where current induction is present, the current flows round and round through the circuit and no matter where a telephone receiver be placed in the circuit, it would be noisy. Current induction is caused by wires carrying large currents, such as street railway feeders, or low tension electric light lines. Static induction is more apt to be caused by high potential alterating electric light circuits.

CHARGING A STORAGE BATTERY.—(218.)

Can a storage battery be charged while the exchange is using current from it? B. A. O.

Yes, many exchanges have no duplicate storage battery so that the condition that you mention becomes necessary. If retardation coils and a condenser are connected in circuit with the charging generator as indicated in Fig. 218, all possibility of the commutator hum from the generator getting to any telephone can be avoided.

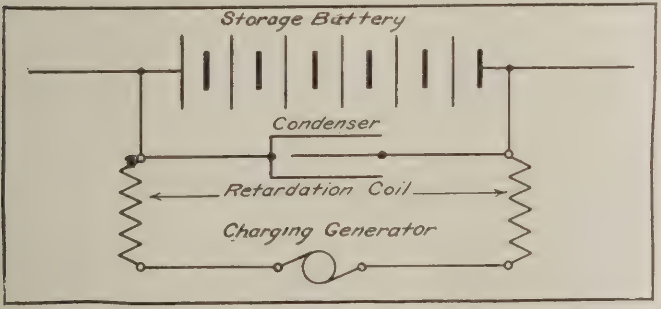


Fig. 218.

SUSTAINING POWER OF A GUY SLUG.—(219.)

Will you please give me an estimate of the holding power of a guy slug or "dead man" placed in the ground 7½ feet? The dead man is 5 feet long. A. B.

From the way the question was originally worded we do not know whether an estimate is wanted on cost of placing such a slug or whether its sustaining power is required. We take it that the sustaining power is wished. If your question is not answered satisfactorily, write us again and give details.

It is not possible to give a very accurate estimate without knowing the nature of the soil and the diameter of the dead man, but we can say that in a general way a dead man 8 inches in diameter and 6 feet long will break a ½-inch strand wire before it will pull up. The given data applies to a good average solid soil with the guy slug buried as stated in query.

WHAT IS A COMBINER?—(220.)

What is a combiner? I saw the term in an English electrical paper. It is some kind of an appliance used in line construction, but from the description given I could not make out what it was. T. O. A.

A combiner is a sort of brace used between crossarms in English line construction. A drawing of combiner is shown at *A* in Fig. 220, and the method of its use at *B*. The English books say: "Galvanized iron combiners are used with all arms carrying eight or more wires and they are fixed to them by means of small bolts. They should be fitted immediately after the arms have been permanently bolted to the pole."

DEFINITION OF MAGNETOMOTIVE FORCE.—(221.)

On several occasions I have heard the term magnetomotive force used, and its meaning has always been a mystery to me. I have a book on electricity and magnetism, but this term does not appear in it. If this query is not too far removed from the subject of telephony I wish you would explain it. T. R. K.

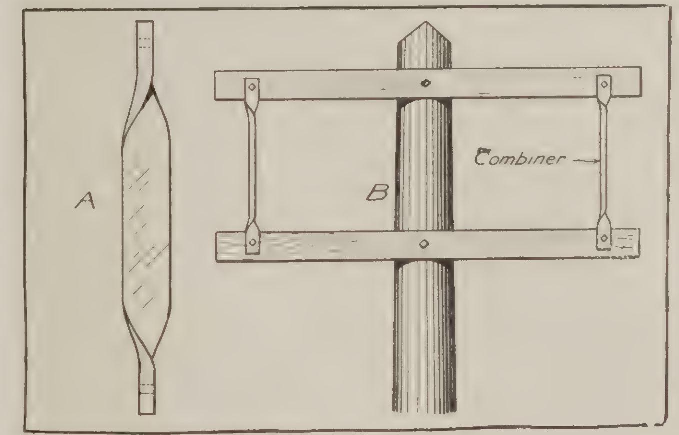


Fig. 220.

In the modern theory of magnetism there is conceived to be a flow of magnetic lines of force through a circuit just as in electricity there is a flow of current through a circuit. Just as in electricity the circuit offers a resistance to the passage of a current, so in magnetism the magnetic circuit resists the flow of magnetic lines. This resistance to the flow of magnetic lines is called reluctance. Again, in electricity, an electromotive force applied to a circuit produces a flow of current in that circuit, and similarly in magnetism a certain force, known as magnetomotive force, is necessary to cause a flow of magnetic lines, or a flux, as it is generally known, in the magnetic circuit. There is a definite law concerning the relation between the three terms above described. It is expressed,

$$\text{Flux} = \frac{\text{Magnetomotive Force}}{\text{Reluctance}}$$

It will be seen that this formula is analogous to Ohm's law:

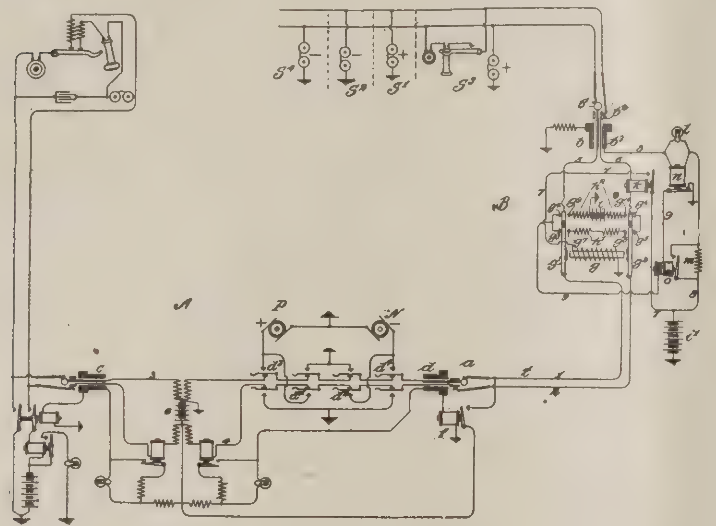
$$\text{Current} = \frac{\text{Electromotive Force}}{\text{Resistance}}$$

Almost any of the large text books on electricity and magnetism will give a complete explanation of the quantities here described and the questioner is advised to refer to them.

PATENTS ISSUED

TRUNK LINE SYSTEM.

Wm. W. Dean, of Chicago, Ill., patents (No. 741,114) and assigns to the Western Electric Company an improvement in trunk lines. The object of this patent is to provide a means whereby the A operator in the originating office can ring a party line subscriber by the use of pulsating currents of different polarity applied to different sides of the line. This patent is illustrated in Fig. 1. It is customary in most trunk line circuits to include one or more repeating coils. Under such circumstances, a pulsating current of any polarity applied to one side of the repeating coil is transformed into an alternating current by the action of the coil. Mr. Dean's invention is to provide a means whereby during the time of ringing, the repeating coils may be cut out of the circuit and the bell at the originating office enabled to ring party lines whose signal is accomplished by pulsating currents. In the drawing, *A* is the office at which the calling subscriber terminates. *P* is the cord circuit in this office, *t* the trunk line from the office *A* to office *B* in which the call subscriber is located. The essential point of this patent consists in arranging the cord circuit in the office *B* so that it contains a repeating coil, whose windings are shown at *h2 and h'*. In one side of this coil the common battery is placed, while the other side forms one side of the repeating coil of the trunk line. There is also a relay *g*, whose armatures *g'* and *g2* are split into two parts by insulating matrial. When the relay *g* is not excited, the armatures stand away from the magnet, and the insulating portion is bridged by the wires *g4* and *g5*. Under such circumstances, the circuit from the ringing generators *P, N,* in the office *A* can be traced directly through the trunk line to the subscribers' line in office *B*. Evidently, then the A operator in office *A* can ring with a pulsating current directly around all the repeating coils. When the subscriber *S1, S2, S3* or *S4* that is thus called removes his telephone from the hook, the relay *G* is excited, the armatures *g1* and *g2* are attracted, the contacts removed from the bridges *g3, g4, g5,* and *g6,* and the contacts *g7, g8, g9,* and *g10* closed. By this means the repeating coil is cut into the trunk line and another battery supplied to the subscriber calling.



POLE CHANGER.

Wm. F. Warner, of Munice, Ind., reissues patent (No. 12162) and assigns to the Warner Electric Company, of Muncie, Ind. This is a patent for a pole changer, the original of which was noticed in our columns about two years ago. The object of the patent is to provide a machine for changing continuous currents supplied by a battery or other form of electric generator into alternating currents suitable to use in signaling subscribers' sub-stations. A perspective view of this apparatus is shown in Fig. 1 and the circuit in Fig. 2. There is a substantial base board *21* (Fig. 1) that carries a pair of electro magnets and a vibrating arm. A battery *31* (Fig. 2) is connected in series with the magnet *34* and the contact *25*. By this means the arm *23* is caused to vibrate in the ordinary manner by the alternating magnetization and demagnetization of the coil at *34*. This arm is provided with two contact points *58* and *53*, which alternately make and break circuit between the springs connected to the posts *61, 62, 63,* and *64*. These contacts and springs are in circuit with the battery *50*, and it is easy from a slight inspection of the circuit to see that the motion of the arm *23* will, at each stroke, reverse the current between these posts, which are connected through the wires *65* and *67* with the switchboard.

Fig. 1.

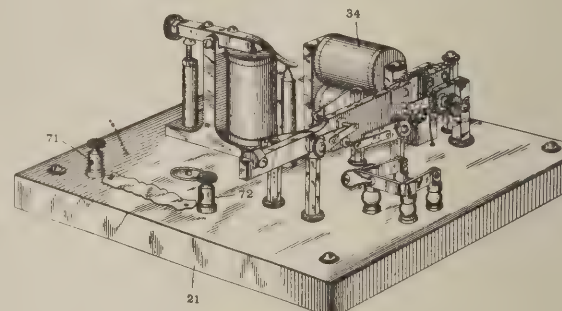
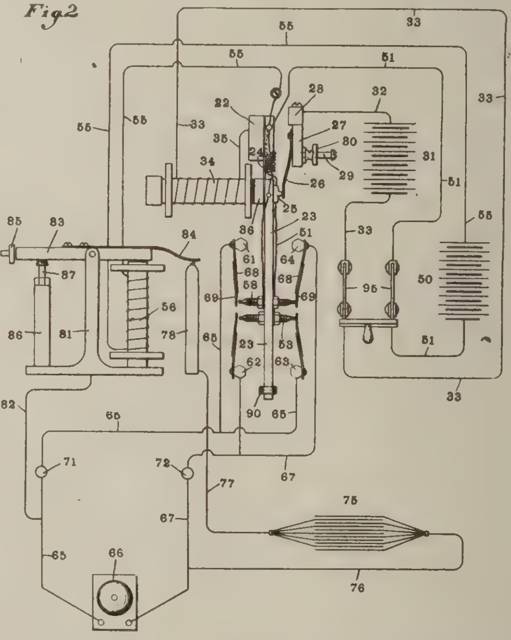
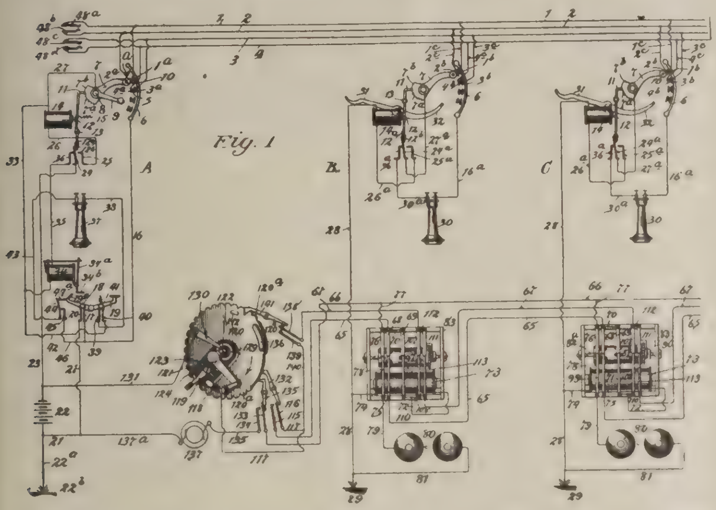


Fig 2



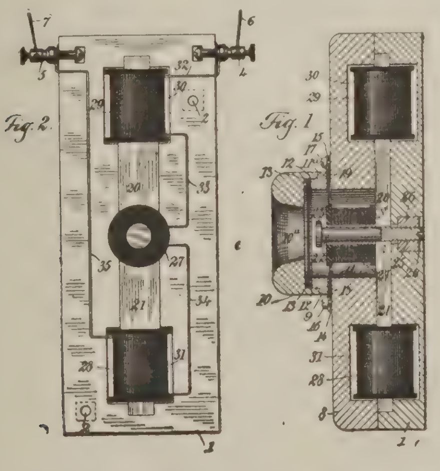
TELEPHONE SYSTEM.

Chas. B. Smith, of New York, N. Y., has been granted four patents (Nos. 741,282, 741,283, 741,284, 741,285,) for a party line system. Patent No. 741,282 is the basic patent, and describes the entire system, while Nos. 283, 284 and 285, relate to details and modifications thereof. The system described by the inventor is a complicated one, requiring six sheets of drawings, and seventeen pages of specifications in the basic patent, while the other three patents are similarly complicated. It is therefore impractical to give anything more than the briefest abstract of the invention, for it is impossible to abridge these patents without mutilating the description to such an extent as to render them practically unintelligible. Those who are interested in this subject would do well to procure the entire series. The basic idea of the invention is shown in Fig. 1. Mr. Smith proposes to extend a number of wires to the various stations in an exchange or upon a party line so that each one is supplied with several conductors. At each sub-station, and at each exchange, a mechanism is provided whereby it is possible to ascertain which one of the wires is not engaged in conversation. At the sub-station as is shown in Fig. 1, this is accomplished by connecting the various wires to contacts at each station, and providing a rotating lever arm *7*, which traverses and touches successively the various contacts which then disengage. The lever then stops at this contact, and enables the subscriber to signal the exchange. With a similar arrangement at the central office there is the same result. As the selection of the disengaged conductor is accomplished electro-magnetically, the system becomes selective and secret.



COMBINED TRANSMITTER AND RECEIVER.

Chas. Yeack, of Akron, Ohio, patents (No. 741,604) a combined transmitter and receiver. The object of this invention is to provide a combination of transmitter and receiver in a single case, and the invention is essentially but little more than an improved magneto telephone. It is shown in Figs. 1 and 2. The invention provides a mouth piece *10* which is secured to a base *1* and *8* composed of two parts. In this base there are a pair of coils that surround the magnets *20* and *21*, so arranged as to present similar poles to each other. There is a diaphram *10a* composed of magnetic material. Sound waves falling upon this diaphram set it into vibration after the usual fashion of a magneto instrument. These vibrators produce changes in the pole piece *22* which affect the magnets *20* in the usual manner. The operation of the device as a receiver is essentially similar to that of the ordinary magneto instrument.



THE ABILINE—KANSAS CITY. TOLL LINE.

By J. A. Can, *Special Correspondent.*

WORK has been begun on the new telephone toll line which is to connect Abiline, Kansas, with Kansas City and to be built on east to Indianapolis. The company, which is composed of the owners of the exchanges at Abilene, Beloit, Manhattan, Junction City, Concordia and Minneapolis, has a capital of $150,000, has started four gangs of men to work and expects to complete the line by January 1ts. The work recently started at Abilene and also at Chapman, Junction City and Manhattan. It is intended to make this simply a toll line for through business and to connect it at this end with the exchanges and country lines of central and northwestern Kansas. A branch line will later run southwest from Topeka. The material to be used has been ordered and a part of it is delivered. It consists of 50 cars of poles, four cars of copper wire, three cars of insulators, one car of bolts and small items, one car of pins for cross-arms and four cars of cross arms. C. P. Dewey, the wealthy ranch owner, of Manhattan, is president of this company; C. L. Brown, of Abilene, secretary; J. W. Smith, of Minneapolis, treasurer.

THE HAVANA CUBA TELEPHONE TROUBLE.

IN a recent issue extracts were published from a Havana, Cuba, newspaper, in which the newspaper editor said some rather unkind things about the Havana telephone service. The company admits that for a short time the service was not the best, but that changing operators was the cause of the trouble. The company decided to put in female operators in place of the men who had had a monopoly of this work since the installation of the plant. This met with opposition on the part of the men, as they did all in their power to prevent the girls from learning the work, and finally arranged a strike at the time when the old system of switchboards of very ancient pattern was about to be cut out and the new ones to be substituted, which were already set up and wired. The company claims that it is not a Bell license or in any way identified with Bell interests. The controlling stock, it is claimed, was purchased by American capitalists about three years ago.

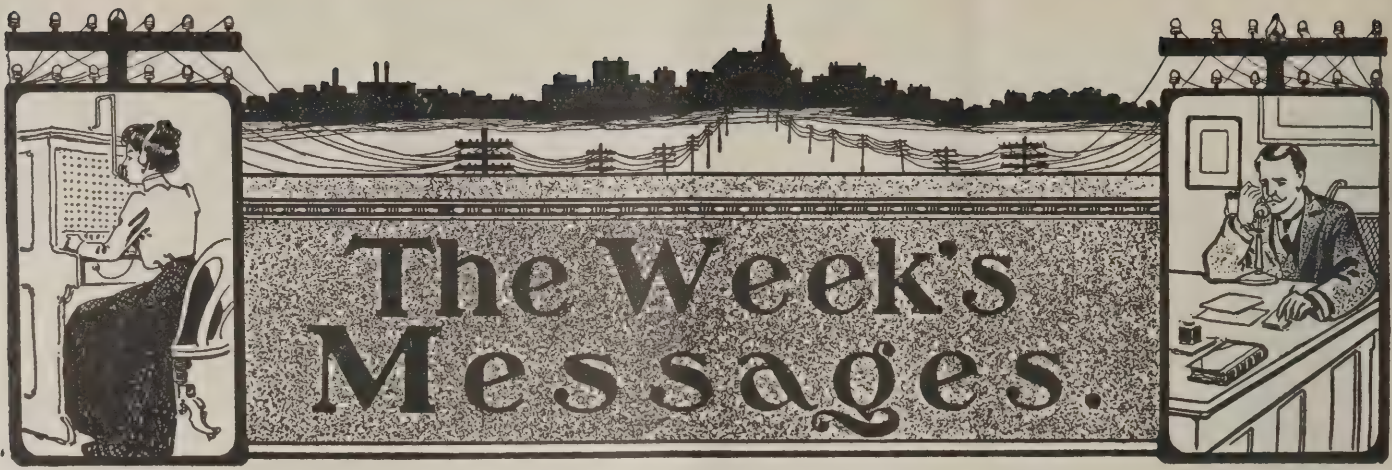
INDEPENDENT COMPANY FOR CHATTANOOGA.

By W. L. Arnold, *Special Correspondent.*

A FRANCHISE has been granted by the Board of Aldermen of Chattanooga, Tenn., to the Hamilton Telephone Company, an Independent company which is composed of some of the wealthiest men of the city, and the construction of an exchange building will be started at once. There has been a hard fight over this franchise, the Bell monopoly, the East Tennessee Telephone Company straining every resource to defeat the entrance of a competitor into the field. The new company is the result of an attempt by the East Tennessee concern to increase rates about 75 per cent., and when the new franchise was before the aldermen for passage the Bell stepped in with a promise to keep rates at the old figures until they got 3,500 subscribers. The lawmakers refused to listen, and now Chattanooga will have telephone competition.

LONGEST TELEPHONE CABLE.

IN length, the longest submarine telephone cable in the world is 245 miles. It is a part of the line between London and Brussels, and was completed June 8, 1903. It is said by those who are well posted that this construction marks the beginning of long-distance sub-marine telephony.



The Week's Messages.

FINANCIAL

SHERARD, ILL.—The Home Mutual Telephone Company, of Sherard, has increased its capital stock from $10,000 to $30,000.

NORTH ADAMS, MASS.—It is expected that the New England Telephone Company will petition the city council for permission to put its wires on Ashland street underground.

BATTLE CREEK, MICH.—The Calhoun County Telephone Company has asked permission to lay conduits in several streets in the city.

WALTON, N. Y.—The Butternut Valley Telephone Company has increased its capital stock from $3,500 to $6,000.

EDDYSTONE, PA.—The borough council has granted permission to the Delaware-Atlantic Telephone & Telegraph Company to lay its wires underground.

ERIE, PA.—The stockholders of the Mutual Telephone Company will meet on November 27th and vote on a proposition to increase the capital stock of the company from $72,000 to $100,000.

FT. WORTH, TEX.—The Fort Worth Telephone Company has increased its capital stock from $304,000 to $450,000.

SOUTH BEND, IND.—The South Bend Telephone Company, at a recent meeting of the board of directors, declared a semi-annual dividend of 2½ per cent. on the capital stock of $200,000.

FRANCHISES

TUCSON, ARIZ.—A petition signed by Levi H. Manning, Burt Wurther, N. E. Plummer, Albert Steinfeld, A. W. Grosetta, asking for a telephone franchise, has been presented to the council and referred to a special committee.

DIXON, ILL.—The Lee County Telephone Company has been granted a franchise to construct and operate a system here.

MACKINAW, ILL.—The Mount Telephone Company has applied to the city council of Mount for a franchise to construct and operate a system.

QUINCY, ILL.—Charles Wheat, W. P. Martindale, and other gentlemen, who say they represent the Federal Telephone Company, of New Jersey, have asked for a franchise here.

MASON CITY, IA.—A. J. Van Valkenberg has asked for a franchise to construct and operate a local telephone system.

ST. PAUL, MINN.—The board of aldermen have granted the Twin City Telephone Company the right to construct poles and wires on about a dozen streets on the east and west ends. Included was the right to put in a conduit at Sixth street. The assembly passed a resolution ordering the company's wires on Woodward avenue underground.

CHILLICOTHE, MO.—At a recent meeting of the city council, S. J. Miller, of the Livingstone County Telephone Company presented a petition asking for a franchise to construct and operate a telephone system here. A franchise was also asked for by Charles Abell, N. D. Evans and F. S. Hudson, who said they represented $15,000 of local capital.

NEW BALTIMORE, O.—The New Baltimore and Venus Telephone and Telegraph Company has been granted permission to erect poles and string wires on the various county roads.

NORWOOD, O.—The Valley Telephone Company has applied to the city council for a franchise to construct a system here. This is the third petition of a similar nature from Independent telephone companies now in the hands of the council.

CLAYTON, PA.—The borough council has granted a franchise to the Eastern Telephone Company, of Camden, N. J.

PITTSBURG, PA.—The Pittsburg & Allegheny Telephone Company has been granted a franchise to construct and operate a plant in Etna.

SHARPSBURG, PA.—The Pittsburgh and Allegheny Telephone Company has been granted a franchise to construct and operate a system here. It has also secured a franchise in Knoxdale.

CHATTANOOGA, TENN.—The board of aldermen has passed an ordinance granting a franchise to the Hamilton Telephone and Power Company. The East Tennessee (Bell) Telephone Company offered to continue giving service at the old rates until there should be 3,500 subscribers, but as this company has so often broken its promise the aldermen refused to accept any more promises.

DE PERE, WIS.—The city council has granted a franchise to the Valley Telephone Company. The establishment of a system here will depend upon the company's success in securing a franchise in Green Bay.

MOORETOWN, N. J.—If a franchise can be obtained the Farmers Telephone Company of Mooretown will construct a system in Delran Township in Burlington County.

HEALDSBERG, CAL.—The Healdsberg and Dry Creek Telephone Company has been granted permission to construct and operate a telephone system in this town.

BEAVER CROSSING, NEB.—The Beaver Crossing Telephone Company applied for a franchise at Milford, Neb.

CRANFORD, N. J.—The Central New Jersey Telephone Company, which is a branch of the Interstate Telephone Company, of Trenton, N. J., has applied for a franchise in this town.

WESTBROOK, ME.—The Northeastern Telephone Company has been granted a franchise by the council to construct and operate a system here with the provision that certain wires are placed underground.

PERSONAL

H. P. DIDRICKSON, who was formerly advertising manager for the Eureka Electric Company, but who now has charge of the advertising for Bullock, Ward & Co., was recently married in Elkhart, Ind., to Miss Vesta N. Kies. They will be at home in Chicago after November 1st.

SIDNEY GILBERT, manager of the Home Telephone Company, of Jackson, O., is a very happy man just at present. The happiness came in form of a baby girl, which, rumor has it, will be named Valencia Ann. We see in our minds a picture of Sidney shooting trouble at 1 A. M. with an empty nursing bottle in one hand and a tallow candle in the other.

MR. AND MRS. H. B. HEWETT and children will spend the winter at Chillicothe, Mo. Mr. Hewett is manager of the Stromberg-Carlson Telephone Company at that point.

GEORGE F. STRATEMEYER, who has been manager of the Citizens Telephone Company at Battle Creek, Mich., for the past two years, has been promoted to the management of the toll line system at the Grand Rapids office. His place here will be filled by A. A. Burch, who has been manager of the office at Greenville.

ALFRED R. POETT, of Santa Barbara, Cal., has been appointed superintendent of construction of the Home Telephone Company and will have charge of the work which will begin in Santa Barbara immediately.

M. F. HOSEA, of Columbus, Ohio, has been employed as manager of the Lebanon, Ind., Telephone Company to succeed Will Scott, who has been granted leave of absence for a few months. It is probable Mr. Scott will report for duty at the New Long Distance Company's office at Indianapolis, where a very desirable position awaits him. He will have temporary charge as manager of the Strauss Telephone Company's interests, which include plants at Warsaw and Ligonier, Ind.

R. E. HAMBLIN, general manager of the Toledo Home Telephone Company, has tendered his resignation to the directors. Mr. Hamblin has a better offer from the Barber & Brailey (Central) Construction Company.

COMBINATIONS

MINIER, ILL.—The Minier Mutual Telephone Company has offered its interests in Hopedale and vicinity for sale.

THE WEEK'S MESSAGES—Concluded.

WAVELAND, IND.—The Johnson Brothers, proprietors of the Waveland telephone system, have sold out to James Robertson. Mr. Robertson expects to extend the system.

HALLOCK, MINN.—Messrs. Swanson and Halverson, of Warren, Minn., have purchased the telephone system for $4,000. It is the intention of the new owners to build a new building and construct several new lines.

PIERCE, NEB.—J. A. Van Wagenen has sold his local telephone exchange to Dr. F. E. Liliedahl, of St. Edwards.

MILTON, O.—The Milton Telephone Company has purchased the plant of the Progress Telephone & Telegraph Company, and has increased its capital stock to $60,000.

SHEBOYGAN, WIS.—At a meeting of the purchasers of the telephone lines of this vicinity, the Northwestern Telephone Company of Sheboygan Falls and Sheboygan county exchanges were consolidated into one exchange, to be known as the Citizens Telephone Company. The Sheboygan Falls Exchange will be entirely rebuilt, a new switchboard being installed. Engineer Strauss, of New York, has been engaged to make plans for the reconstruction of the lines in this city. All wires on the main streets will be placed underground.

UNIONTOWN, KY.—V. L. Givens, J. R. Jenkins and Dr. H. E. Whitledge have purchased a local telephone system from Claiborne P. Cassell.

EDON, O.—The Edon plant of the Williams County Toll Company has been sold to a new company to be known as the Edon Home Telephone Company.

GREAT BEND, KAN.—The Grimes Brothers Telephone Co., of this city, has sold out its system in Great Bend to the Rock Telephone Company, of Larned and Pawnee Rock, Kansas. The purchase includes all toll lines, station instruments and central exchanges. The managers of the Rock Telephone Company are up-to-date men and will operate a first-class telephone system in this city.

OBITUARY.

LINDALE, KAN.—G. F. Hackamack, who was a stockholder and a very important officer in the Lindale Telephone Company No. 2, also of the Farmers' Telephone Exchange of this place, died at his home recently.

UNDERGROUND

WAUKEGAN, ILL.—The Chicago Telephone Company has asked permission to put conduits in the downtown streets for placing its wires underground.

PORTLAND, ME.—The New England Telephone & Telegraph Company has asked the city council of South Portland for the right to lay underground conduits and cable on certain streets in South Portland.

BROOKLINE, MASS.—The selectmen have granted the petition of the New England Telephone & Telegraph Company asking permission to lay underground conduits on certain streets.

ST. LOUIS, MO.—Arrangements are being made by the Kinloch Telephone Company to install a complete system of underground conduits for their wires in East St. Louis.

ELECTIONS

TOULON, ILL.—At a meeting of the Stark County Telephone Company the following directors were elected: E. G. Cole, of Toulon; Mathew Sparr, of Wyoming; J. H. Duncan, of Almira; Fred Price, of Goshen, and W. R. Sandham, of Wyoming. Fred Price was elected president.

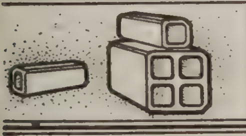
BOONE, IA.—The directors of the newly organized Farmers Co-operative Telephone Company met recently and elected the following officers: Arthur Wills, president; S. N. Gift, vice-president; E. J. Hughes, secretary, and J. G. Ahrens, treasurer.

BURLINGTON, IA.—The annual meeting of the stockholders of the Henry County Telephone Company was held recently and the following directors elected: W. W. Lee, J. T. McLaughlin, W. F. Francy, J. L. Portlock, J. Peterson, James Whiting and James Patton.

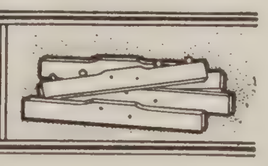
NEW LONDON, IA.—The New London Telephone Company has elected the following directors: W. W. Lee; T. J. Loughlin; W. J. Francy, J. E. Peterson, James T. Whiting and J. A. Patten.

ADENA, O.—Stockholders of the new Harrison & Jefferson County Telephone Company held a meeting recently and elected the following directors: Wm. P. Moore, B. M. Hastings, Milton Hall, W. H. Thompson and John G. Iskis. Mr. Moore was elected president, and John G. Iskis secretary. The central office will be located here, and work will soon be commenced on the construction of the lines.

WESTERLY, R. I.—At a meeting of the stockholders of the Westerly Automatic Telephone Company, the following officers were elected: Dr. John Champlin, president; A. B. Crafts, vice-president; J. Irving Maxson, secretary; Charles E. Sherman, treasurer. The old directors were reelected.



New Construction in the Field



PINE BLUFF, ARK.—The Pine Bluff Telephone Company has decided to make extensive improvements in its system.

GENESEO, ILL.—Representatives of the Hurley County Mutual Telephone companies held a meeting here recently and voted $5,000 to erect a modern exchange in this town, from which all the lines of the county will diverge. A lot has been purchased at a cost of $1,000, on which a two-story brick building will be erected.

HAZLETON, IND.—The officers of the Princeton Independent Telephone Company, of Princeton, met local citizens of the town trustees recently and asked them to form an Independent telephone company to work in conjunction with the Vincennes and Princeton Telephone companies.

OSKALOOSA, IA.—The Home Telephone Company is making arrangements to greatly improve and extend the local system.

SLOANE, IA.—Bertel M. Stoddard is constructing an Independent telephone system between Sloane and Owego.

FENTON, MICH.—The Fenton Mutual Telephone Company held a meeting recently, at which it was voted to instruct the officers to levy a special assessment for the purpose of putting the telephone lines in good working shape.

MENOMINEE, MICH.—Capt. Nels Anderson, owner of the tug Thomas Thompson, has secured a contract from the Government to lay a telephone cable from Mainland, Dorr County, Wis., to Plum Island.

MUNDA, N. Y.—The directors of the Munda Telephone Company have decided to construct a line to Dalton, and another branch to Brooks Grove.

SODUS, N. Y.—The Wayne-Monroe Telephone Company, which was recently incorporated, is preparing to construct a system in this town.

WOLCOTT, N. Y.—Dr. E. T. Phillips will install a switchboard and furnish the local telephone service. He says the Wayne County, Red Creek, North Wolcott and Butler companies will be connected to the switchboard.

WHATCOM, WASH.—D. E. Lain, of the committee appointed by the Commercial Club to arrange for the telephone connection with the San Juan Islands, has submitted a proposition to the club which provides for the formation of a local stock company which is to absorb the line by which the Islands are at present connected and the laying of a cable between the nearest island and this city.

LEXINGTON, ILL.—The Prairie Hall Telephone Company, of Lexington, is remodeling its line running east from the city.

TAMORA, NEB.—The Tamora Telephone Company has completed construction in town and will commence building in the country at once. The company expects to build several rural lines before the end of the year.

WESTMINSTER, OHIO.—The United Farmers Telephone Company held a meeting here recently and considered the question of purchasing property on which to build a central office. The company is at present constructing its lines.

YORK, NEB.—The York Telephone Company has completed the west line to Hampton and expects to extend all lines before spring.

LA GRANGE, MO.—John Harrison, Alfred Smith, Clarence Smith, Robert Ewing and William Weber are the stockholders in the company that will construct a telephone line from this place to Weber, Mo.

GREENVILLE, W. VA.—T. A. McNeer, general manager of the Greenville Telephone Company, held a consultation with representatives from Union and other towns, to decide whether to extend the lines of the company through the upper part of the county into Greenbrier and Allegheny Counties.

SEATTLE, WASH.—Advices from Dawson state that N. A. Fuller, president of the Yukon telephone syndicate, operating in Dawson and vicinity, and four others, have formed a company to be known as the Fairbanks Telephone Company, with a capital stock of $50,000, for the construction of a telephone system in Fairbanks.

TRADE NOTES

The Jones & Winter Co., of Chicago, contractors, have begun the work of putting in the plant for the Washtenaw Home Telephone Co., at Ann Arbor, Mich. It is the expectation that by March 1, the city will have a competing telephone service.

The F. Bissell Company, Toledo, Ohio, to introduce its new spider wire cleat, is sending a sample of the cleat with the holes bored for small wire, to those on its mail list. The cleat is attached to a private mail card. The card contains, on the reverse side, a table of prices for insulated bridle rings, which will be found convenient for reference.

Hart and Company, of 803-809 Monadnock Building, Chicago, has taken over the wholesale department of the Tornquist protector. This apparatus is a combination lightning arrester, ground switch, fuse, and lever cut out. It permits of the instantaneous disconnection of a telephone instrument from the line without interfering with other instruments on the same circuit. This company already has a high commercial standing, and is one of the best concerns in the electrical field. They are proprietors of the Red Cross Commutator Lubricant and also handle a special high grade carbon brush for dynamos and motors.

The Holtzer Cabot Electric Company, of Boston (Brookline), Mass., has issued an artistic little booklet, the object of which, so it says, is to illustrate and briefly describe a few of the more important Holtzer Cabot specialties, some of which are entirely new. The booklet takes up battery telephones, selective ringing office telephones, selective ringing desk set equipments, Ness intercommunicating instruments, the Hotelephone, hotel telephone annunciators, the Holtzer Cabot magneto clock, gas engine igniters, single phase self-starting alternating current motors, and small direct current motors and dynamos. It will be sent for the asking.

The National Steel & Wire Company of New Haven, Conn., have taken to associate with them as a subsidiary company, the National Steel Foundry Company, recently organized by prominent local interests in New Haven. The National Steel Foundry Company have purchased a part of the 50-acre site owned by the National Wire Corporation (also a subsidiary company of the National Steel & Wire Company), that location having both railroad connections and dockage capable of accommodating ocean going steamers of large tonnage. The Foundry Company will be able to remelt in their open hearth furnaces all of the waste from the wire and rod mills of the National Wire Corporation, and thus much of the scrap necessary to make steel castings will be provided for and freightage thereon saved.

The National Steel Foundry Company were originally organized to supply the trade of New England and New York, throughout which section, in common with the rest of the United States, there has been and still is a scarcity of steel castings. This union of interests, however, immediately opens a broad field, as the National Steel & Wire Company maintain selling departments in Chicago, Kansas City, San Francisco and De Kalb, Ill., as well as in Boston, New York and New Haven.

The American Electric Fuse Company of Chicago, New York and Atlanta, has issued a catalogue. It says in the front: "FUSE," being a catalogue of telephone and electrical specialties." Good plain cuts are shown of all the apparatus and the technical descriptions given are all that could be asked. The subject of telephone protection, both central office and sub-station, is covered quite fully. In all cases, the illustrations, which are wood cuts, are clean, sharp and plain, and go far toward aiding the crisp explanations. Combined distributing frames and switchboard protectors are given enough space so that they cannot help but be understood. The use of the company's test plug is explained and the advantages and principle of operation of the Rolfe self-soldering heat coil are gone into. Among other things that the catalogue covers are terminal blocks, tubular line fuses, pole terminal boxes, cable heads, individual telephone protectors, line fuse boxes, and sneak current protectors. All appliances that could come under the head of protective apparatus are given description. The catalogue should be in the hands of every telephone man. He will find much in it that is worth while.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

TELEPHONE SYSTEM.—Telephone System in Northwest Arkansas, 200 miles in operation, 325 subscribers, 200 miles extension needed immediately. No Competition. Excellent connections can be had with Indian Territory, Joplin, Springfield, and other Missouri points, also Little Rock, Arkansas. This line is key to the situation. Pays 15% annually, best prospects to pay 25% inside of a year. Boom in progress. Three new railroads building; also electric line and two other roads under survey. Lack of transportation has heretofore retarded the growth of the country. Good reasons for selling. Address, HERMAN H. VER MEHREN, 633 Paxton Block, Omaha, Neb. 96.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

POSITION.—A first-class construction man with thirteen (13) years' experience in telephone (both Independent and Bell) and electric light work, desires connection with a telephone company in its construction department. Will be at liberty Nov. 30. Address, Box 99, The American Telephone Journal, 116 Nassau St., New York City. 99.

POSITION.—Wanted position as Superintendent or Manager of telephone company. Have had 9 years' experience in building telephone exchanges, operating and maintaining. Have just finished 200 miles of toll line and 5 exchanges. Am Superintendent of Construction for Bell Telephone Company at present; 30 years of age, and strictly temperate. Can furnish best of references. Address, P. O. Box 52, Malden, Mo. 94.

ARE YOU AMBITIOUS? Would you like to make more money than you do at present? We can tell you an easy way to do so. Write at once for full particulars. Address Box 93, care of The American Telephone Journal, 116 Nassau Street, New York City. 93.

TO LEASE EXCHANGE.—Wanted to lease, Telephone Exchange by experienced man. Will correspond with parties having exchange with or without toll lines, with view of buying. West or Southwest preferred. Address, Box 92, The American Telephone Journal, 116 Nassau Street, New York City. 92.

POSITION.—Position wanted by a practical expert with a company about to build or desiring to enlarge its exchange. Have machinery for manufacturing telephone appliances. Address, Box 95, The American Telephone Journal, 116 Nassau Street, New York City. 95.

POSITION.—A gentleman with twenty years' experience as general manager of a successful (Bell) Telephone Company is open for an engagement. Familiar with all the details of construction, maintenance and operating. Best of references as to character, honesty and ability. Address Box 100, The American Telephone Journal, 116 Nassau St., New York City. 100

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau St., New York City. 73.

The American Telephone Journal

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VOLUME VIII *SATURDAY, OCTOBER 31, 1903* *NUMBER 18*

A SUBSTANTIAL CRADLE GUARD

UNINSULATED trolley wires of electric railways have always been a menace to telephone plants, for in the case of a wind or sleet storm a broken wire falling across the comparatively high tension trolley line immediately becomes a pathway leading a 500 volt current into either the telephone central station or into the sub-station, as the case may be, which, of course, depends on the circumstances. The intrusion of such a current is likely either to set fire to the switchboard, or to destroy the sub-station equipment. In spite of the best efforts of inventors to derive an invention to be an infallible protection to the trolley current, much damage is annually attributable to this cause. Some attempts have been made to attack the problem from the other end, and to prevent broken telephone wires from coming in contact with the trolley wire rather than prevent the flow of current after a cross has been established. As telephone wires are of necessity placed above the railway trolley wires, efforts in this direction have been in the nature of constructing some sort of a guard or cradle that should be placed between the telephone system and that of the railway, and serve to catch a broken telephone wire and prevent its coming in contact with the trolley wire. Figs. 1, 2, 3, are illustrative of a recent piece of construction of this nature which was constructed over the line of the Fonda, Johnstown & Gloversville Railway of New York State. The illustrations were taken from a recent number of the *Street Railway Review.* Fig. 1 is a photograph showing a telephone cradle erected to prevent telephone wires from falling upon the high-tension lines of an electric railway which are carried on the electric railway poles. This illustration is almost self-explanatory, but is given more in detail in Fig. 2, which shows diagrammatically the arrangement. On either side of the railway crossing the telephone wires are carried upon higher poles in order to give ample room underneath the lines for the construction of the protecting cradle. This device is built by placing two substantial cross-arms at a distance of two or three feet below the lowest telephone cross-arm. Upon the outer ends of these arms a substantial half-inch steel wire strand is strung and supported by means of a bolt, as shown in Fig. 3. These strands are carried over the railway lines and anchored at a reasonable distance at either side of the line poles, as shown in Fig. 2. The object of these strands is to support a series of wooden cradle bars that are laid across and attached to the strands directly beneath the telephone wires and over the high-tension lines. It is necessary to make these bars of sufficient length so that under no circumstances a falling telephone wire is able to escape at either side of them, but must drop directly on the bars. It is also necessary to set the bars close together, so that the wire cannot fall between them and thus come in contact with the high-tension line. In the case shown in the drawings the bars were arranged on 12 inch centers, which distance has been proven by practice to be about right. An L shaped piece of ¾ inch x 3/16 inch strap iron is bolted to each cradle bar as shown in the drawing, and is held in place by the same bolts that hold the bar on the supporting strand wire. The

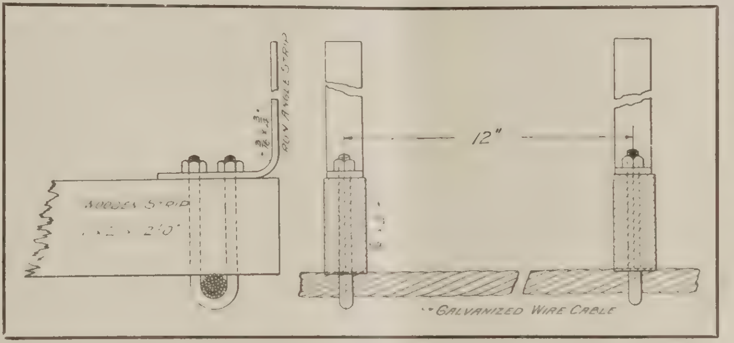


Fig. 3. Detail Drawings of Cradle Bar.

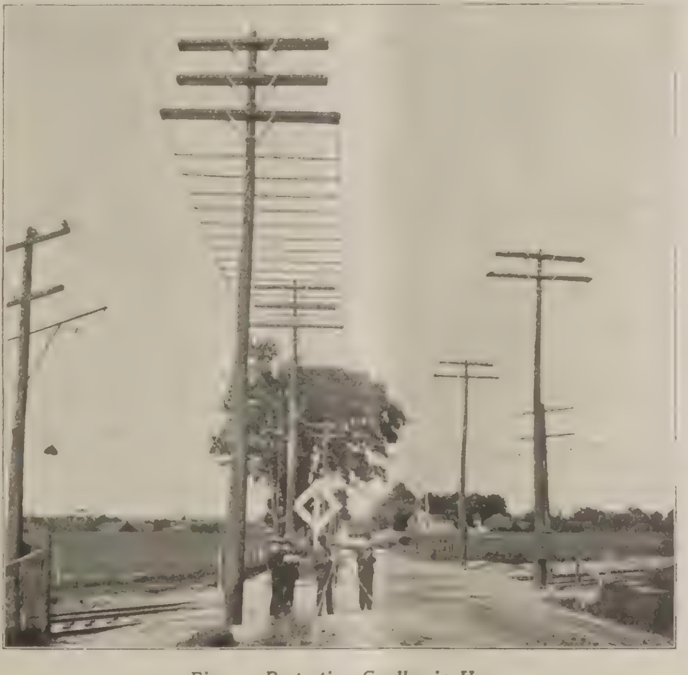
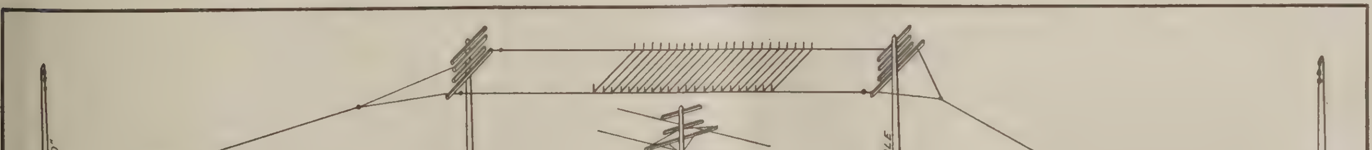


Fig. 1. Protecting Cradles in Use.

Fig. 2. Perspective View of Cradle Guard Showing Arrangement of Supporting Stands.



function of this iron is to prevent any fallen wire from slipping off the end of the cradle bar. Fig. 3 gives a dimensioned detail of the method of constructing cradle bars and of attaching them to the strands. The experiment of building catch cradles of wire net has been tried in some cases, but these have proved less satisfactory than the wooden cradle herewith shown, because under some circumstances the wire cradles became charged from the high-tension lines and proved a source of danger instead of a means of protection. Wherever a cradle guard has been used it has soon paid for itself by the burnouts it has prevented.

A CABLE SPLICER'S FAULT FINDER

By Charles L. Goodrum, *Engineer United Telephone & Telegraph Co.*

The maintenance and repair of telephone lines and cables form a very considerable part of the operating expenses of a telephone company. Consequently any practical apparatus which simplifies the locating of trouble is of importance. The instrument which I describe below was designed nearly a year ago and has been in practical use by linemen, cable splicers and inspectors in the United Telephone & Telegraph Co. of Philadelphia. It is simple in its design and gives results with little calculation, so it can be used by men unacquainted with the electrical principles of a Wheatstone Bridge.

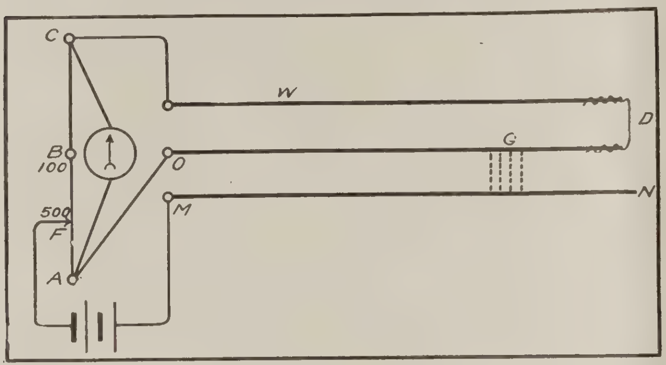


Fig. 1

The method may be used for locating faults or grounds either where there are two wires, one of which is crossed and the other is good, that are of equal resistance; or where there are two good wires running to the same point as the wire which is faulty. In the latter case it is not necessary that the good wires should either be like each other or like the faulty wire; neither is it necessary that they should run alongside of the faulty wire.

To illustrate the first case, Fig. 1, *A B* represents a resistance wire stretched over a scale having 1,000 divisions, and *B. C* a wire in series with it of equal length and resistance. *O D* represents a telephone wire crossed on another telephone wire *M N*, and *C D* represents a good wire of equal resistance to *O D* and parallel with it. A battery has one terminal connected to the wire *M N* and the other terminal is connected to a sliding contact, which can be placed in any position along the wire *A B*. A galvanometer is connected between *A* and *C* as shown. By sliding the contact point *F* up and down the wire *A B*, a position will be found at which the galvanomoter will give no deflection. It is evident that the distance from *A* to *F* will be the same proportion of the total distance *A B* as the distance from *A* to the fault *G* is of the total distance *A D*. Consequently, if the total distance from the point *A* to the point *D*, where the good and faulty wire join, is known, the proportion of this distance to the point *G* can be determined directly from the position of the contact piece *F* on the scale *A B*. For instance if the figure the contact piece rests at the division 500. Consequently the distance to the fault is 500-1000 of the distance *A D*. If the balance had been obtained with the contact piece *F* at the scale division reading 450 and the distance from *A* to *D* was five miles, the distance to the fault *G* from *A* would be 450/1000 of five miles or 2.25 miles.

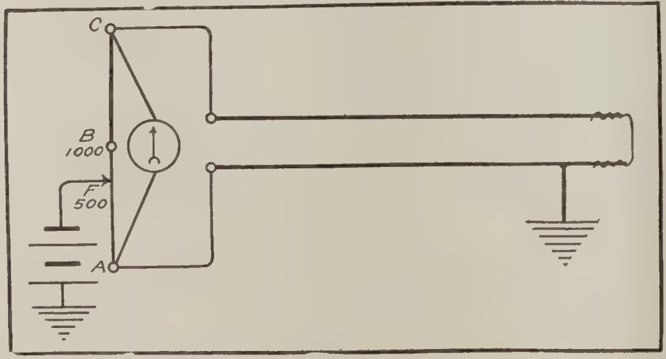


Fig. 2

A ground to the cable sheath is frequently of variable and sometimes high resistance, so extra battery may be required up to 50 or 100 cells. In many cases the faulty wire will not be grounded to another wire or the sheath of the cable (represented in the diagram by *M N*) but may be grounded through a high resistance to earth. In such cases, the free end of the battery must also be grounded, and if the resistance is very high it may be necessary to use a battery of 50 or 100 volts. The connections for this arrangement are shown in Fig. 2.

In Fig. 3 the faulty wire *A D* has extending to its end, but not necessarily alongside of it, two other wires, *C D* and *C E D*, which are not of equal resistance and do not equal in resistance the wire *A D*. The distance to the fault is determined as follows: *A B* and *B C* represent the same apparatus as in the previous case. First, connect the wire *C D* to the post *C*, the wire *A D* to the post *A* and at the distant end, join all three of the wires together. Then connect one end of the battery to the wire *C E D* and find with the contact *F* a position on the scale which gives no galvanometer deflection. Call this reading C. Then with the wires connected as shown in Fig. 4, that is, with one end of the battery connected to the wire *M N*, find another position with the contact which gives no galvanometer deflection. Call this position C′. Designate the distance *A D* by L. The distance of the fault *G* will then be $\frac{C^1}{C}$ L.

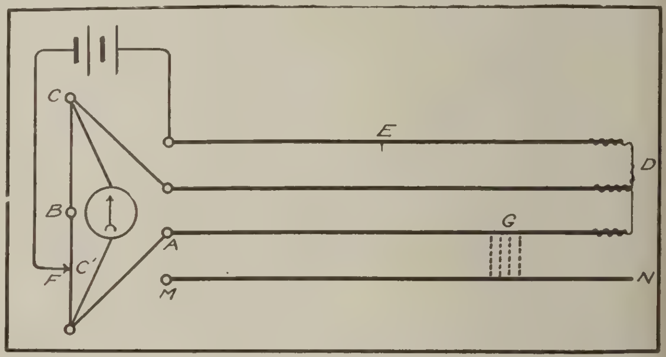


Fig. 3.

For instance, if the reading C is 900 and the reading C′ is 450 and the distance *A D* 2½ miles, the distance to the fault *G* will be $450 \div 900 \times 2.5$ miles $= 1.25$ miles. In case the ground *G* is not to another wire or is of a high resistance to the cable sheath, it may be necessary to use extra batteries. It will be noted that no use was made of the wire *B C* in either of the above measurements. In making the instrument, it is consequently not necessary that this be in the form of a straight wire exposed, but it can be in the form of a resistance coil of equal resistance to the wire *A B*. It may happen, however, in the second case in getting the reading C that the contact *F* will not come on the wire *A B*, as the resistance *B C* is in series with it. This will always be the case when *C D* has less resistance that *A D*. It is consequently advisable to have the apparatus arranged so that this resistance *B C* can be cut out by shortcircuiting. The result will be the same whether the resistance *B C* is shortcircuited or not in this test. It must, of course, be shortcircuited in taking both of the readings C and C′ if it is shortcircuited in either one. It is absolutely necessary in making a measurement by the previous method that this resistance *B C* be in circuit with the resistance *A B*.

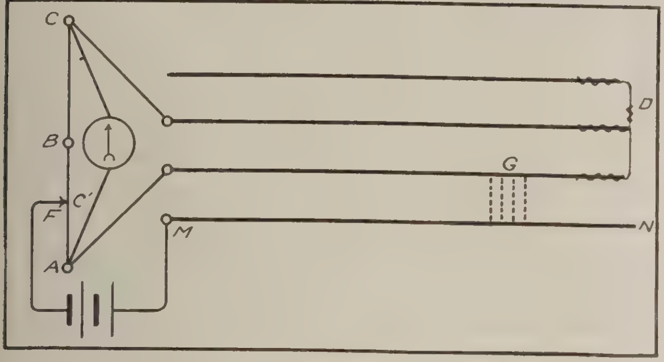


Fig. 4.

Fig. 5 is a diagram of the instrument as laid out in practice. The wire *A B* is divided into four parts which are stretched alongside of each other and provided with a scale of equal division reading from 0 to 1000. In series is the resistance *W* between the points *B* and *C* which is equal to the resistance of the wire *A B*, and connected to the point *C* is a binding post marked *"Test."* Connected to the point *A* is a pair of blocks, which are ordinarily plugged together, but which may be disconnected so as to introduce an infinite resistance, and to one of these blocks the binding post marked *"Faulty"* is connected. The galvanometer with a key in circuit with it is connected between the posts *"Faulty"* and *"Test,"* as shown. The key is provided with an arrangement for locking it down so that the galvanometer circuit may be permanently closed. The battery is connected between the posts marked *Gr.* (ground) and *Ba.* (battery) through the resistances *m* and *n*. At the junction of the resistances *m n*, a flexible conductor leads to the movable contact *F*. The resistance *m* is such as to prevent the possibility of overheating the wire *A B*, even when there is a very small resistance in the outside circuit, and the resistance *n* is to serve a similar purpose when a large outside battery is connected to *B A* for the sake of making tests when there is high resistance in the ground.

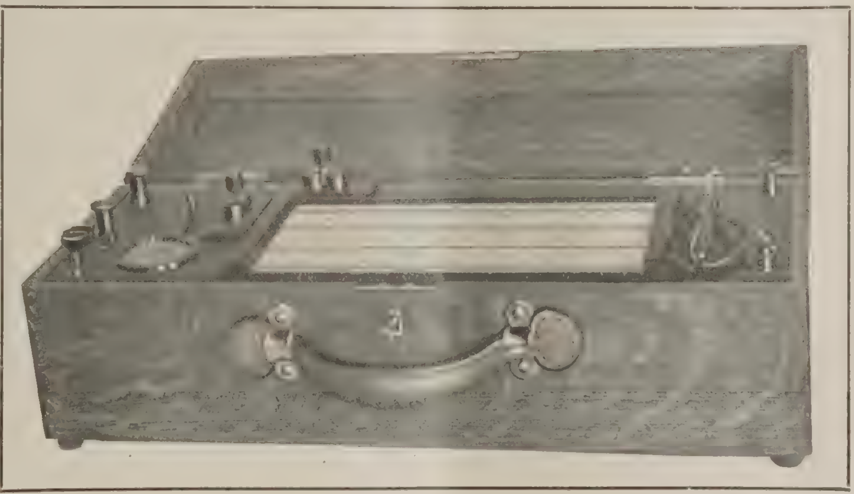


Fig. 6.

Fig. 6 shows the apparatus as actually constructed, that is, mounted in a substantial carrying case, containing a diagram and instructions in the lid. A highly sensitive portable galvanometer forms an important part of the outfit. This sensitive galvanometer can also be used to determine which is the faulty wire in a lot of wires. To do this, it is only necessary to unplug the infinite resistance connected at *A* and to fasten the contact *F* under the binding post *"Test."* It will then be seen that the battery is in series with the galvanometer and the two posts *Gr.* and *"Faulty."* If *Gr.* is connected to the ground or the cable sheath and the wires one after another to the post *"Faulty,"* the faulty one will easily be detected by a strong galvanometer deflection. If the galvanometer is sufficiently sensitive to give a deflection of 1 scale division for one volt through one megohm, it can be seen that it will detect even very high resistance ground or fault, such as ordinarily might be met with in every day work.

In teaching linemen to use the instrument, it is convenient to stretch wires in a room and make them represent the conditions of a cable circuit, and cross or ground then the points which can be easily measured and locate the trouble by means of the instrument. After a man has worked out a few practical exercises in this way, he gets confidence in the apparatus and becomes very efficient in locating trouble. The following examples of locations of trouble are taken from actual practice.

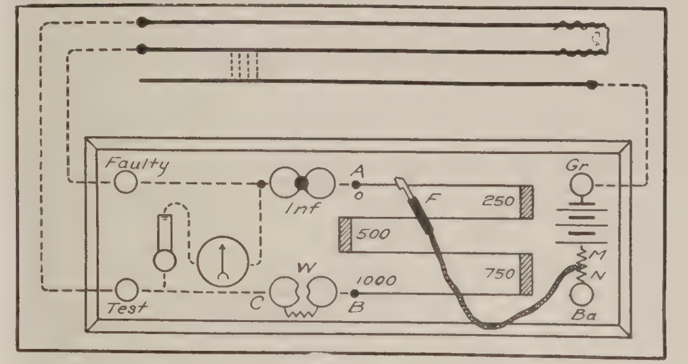


Fig. 5.

EXAMPLE No. 1.—A fault was discovered in a cable in which there were also two good wires. Consequently the first method was applicable. The connections were made in accordance with Fig. 1, *A D* representing the faulty wire, *C D* the good wire and *M N* the cable sheath. *A D* and *C D* were joined at their distant ends, and the distance *C D* was 4,490 ft. The contact point, *F*, showed a balance for a reading 936. The distance to the fault was consequently 936 ÷ 1000 × 4490 = 4202.6. This would make the fault 287.4 feet from the point *D*. It was actually found 285 feet from that point.

EXAMPLE No. 2.—In a second case of the same kind, the distance *A D* was 1,314 feet. The reading on the scale was 990, hence the distance to the fault was 990÷1000×1314=1300.8. This would make the distance 13.1 feet from the point *D*. It was actually found to be 11½ feet from that point.

EXAMPLE No. 3.—In this case, there was not another wire running parallel with the faulty one, of the same size and resistance, but there were two wires as represented in Figs. 3 and 4, and connections were first made as shown in Fig. 3, from which the reading C was found to be 136 divisions. Connections were then made as shown in Fig. 4, and the reading *C* was found to be 12.8 divisions, from which the distance to the fault equalled 12.8 ÷ 136 × 1232 = 115.2. This makes the fault at a distance something over 115 feet from the point *A*. It was actually located within three feet of the position thus found.

Linemen and trouble men and all of those around the telephone plant whose work might at any time be assisted by it very readily take to the use of the instrument and soon become familiar enough with its operation to make the tests with despatch.

DUPLEX TELEPHONE CIRCUITS

By Chas. H. Coar.

NUMEROUS circuits for duplexing telephone lines have been devised in the past, but complexity has interfered with their widespread introduction. The circuits here illustrated, while not infallible, will prove a means of taking some of the load from crowded toll service. The operators at each exchange may do all calling, checking and necessary communicating among themselves over the duplex, thus keeping the toll lines themselves in the service of the patrons all the time.

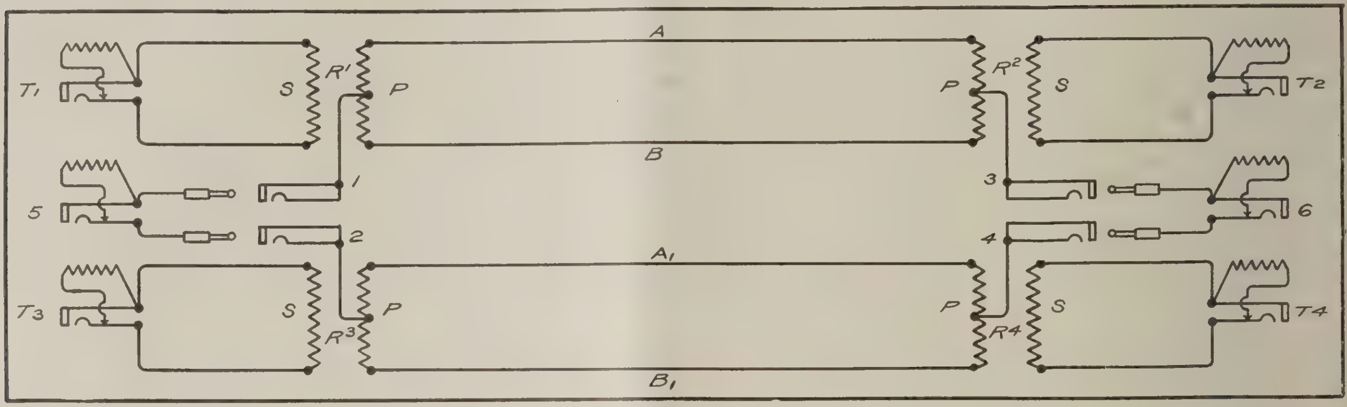


Fig. 2.

In Fig. 1 we find the simplest form of a duplex in which *a* and *b* are the two sides of the metallic line. T_1, T_2, are the regular station telephones bridged across; R_1, R_2, R_3, R_4, are resistance coils such as 1,000-ohm ringer coils joined to the lines *a* and *b*. At *c* and *d*, the junction points of these coils, taps are run to grounded telephones T_3 and T_4, forming the duplex.

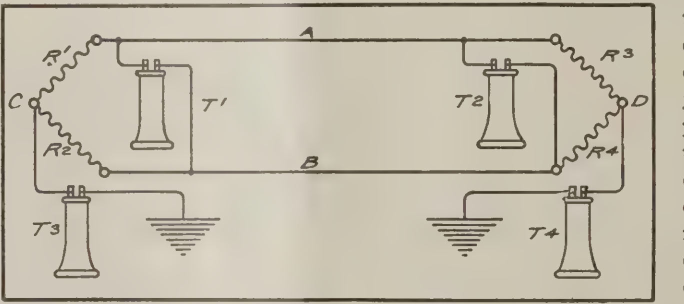
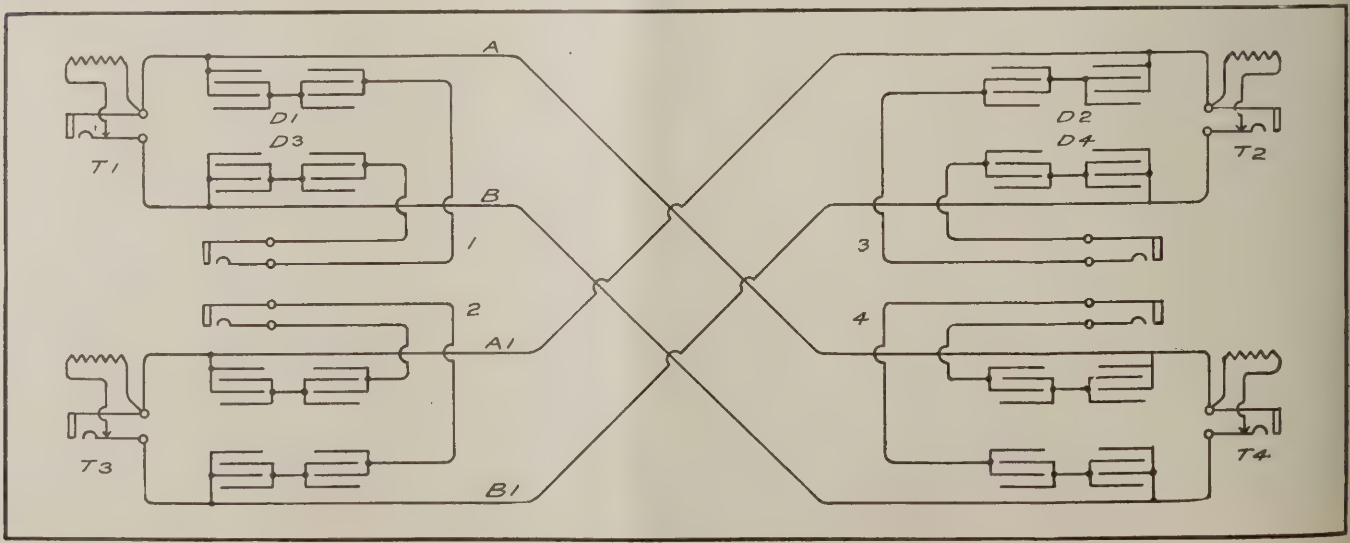


Fig. 1.

The theory of this circuit is as follows: T_1 and T_2 work as regular bridging stations; the coils R_1 and R_2 (the same applies to R_3 and R_4) should be mounted together on an iron frame; as in this way they offer so much self induction and retardation that no perceptible amount of the talking current from T_1 and T_2 flows through them. The taps *c* and *d* being made in the middle of these coils split the current from the telephones T_3 and T_4, causing a part to flow over *a;* also *b*. It is of great importance to have the resistance from *c* over *a* to *d* the same as from *c* over *b* to *d*, as the split current should be equal on each side, as it thus neutralizes itself causing no sound in the telephones T_1 and T_2. The coils R_1 and R_2, should be wound so that their combined resistance will be considerably higher than that of the line, as they are wound in opposite directions from the tap *c*, also from *d*, they oppose each other from this point and offer but small resistance to the current from the telephones T_3 and T_4.

In Fig. 2, we have two toll lines, *a*, *b;* a_1 and b_1. Forming the different sides, R_1, R_2, R_3, R_4, are repeating coils wound to 250 ohms a side. *P* stands for primary, *S* for secondary. The stations, T_1 and T_2, talk through the repeating coils in the usual manner, the same applies to T_3 and T_4. Taps are run from center of the primary coil of each repeater to single point jacks *1*, *2*, *3*, *4*. Single point plugs adapted to fit these jacks terminate in metallic jacks and drops *5* and *6*, which form the duplex circuit. Arranged in this manner the duplex can be put on or off at will. This duplex circuit operates as follows: From the stations *5* and *6* the current leaves to the middle point of the primary of each repeating coil where it splits, part going over each line. Thus neutralizing itself as explained by Fig. 1. The same precautions have to be taken as to the resistance from the taps over each respective side being the same. Should one side have less resistance a greater amount of current would

Fig. 3.



flow through that side, disturbing the balance and causing cross talk.

In Fig. 3, we have departed from coils and condensers of 1 + M.F capacity are used instead; T_1, T_2, T_3 and T_4 are the regular stations and a, b, a_1 and b_1 are the line wires; from each line wire two condensers, d_1, d_2, d_3, d_4, are cut in series to a point in the metallic jacks, *1*, *2*, *3* and *4*. The same arrangement as *5* and *6* in Fig. 2 can be used to connect the duplex to these jacks.

Mr. Balfour Talking Into the Electrophone Transmitter at Sheffield. See the "Foreign Currents" Page of This Issue. Photographs from the London "Sphere."

It will be noticed that the circuits T_1 to T_2 and T_3 to T_4 will be left in their nomal condition at all times, the duplex is not in use, as the condensers remain open at the jacks then. As soon as the duplex plugs *5* and *6* (Fig. 2), are inserted into the jacks *1*, *2*, *3* and *4*, they cause a split circuit through the condensers to each line wire. The duplex works by the theory advanced in the explanation of Fig. 2. Four of these condensers will not cut down the talking current from the regular stations to any great extent. A successful duplex circuit will result only from experimenting with the lines on which they are worked, always keeping in mind the paramount importance of having the lines in perfect balance.

It is mostly a matter of choice whether coils or condensers are used, only with the latter you have the advantage of leaving the line entirely free from apparatus when the duplex is not in service; also condensers serve to give better satisfaction on lines traversing a mountainous country where they meet a great many changes of altitude. All apparatus necessary to form the duplex should be placed where it can be handled readily in case the duplex circuit should be come faulty as they often do during changes in the weather. Whenever the lines from which the duplex circiut is formed run among or adjacent to other lines a transposition, as shown in Fig. 3, every 10 or 15 miles may be necessary in addition to the regular line transposition. It will be found that if the points herein outlined relative to keeping the coils balanced are closely followed the duplex circuit can in many cases be made well worth its installation.

THE LAW SYSTEM.

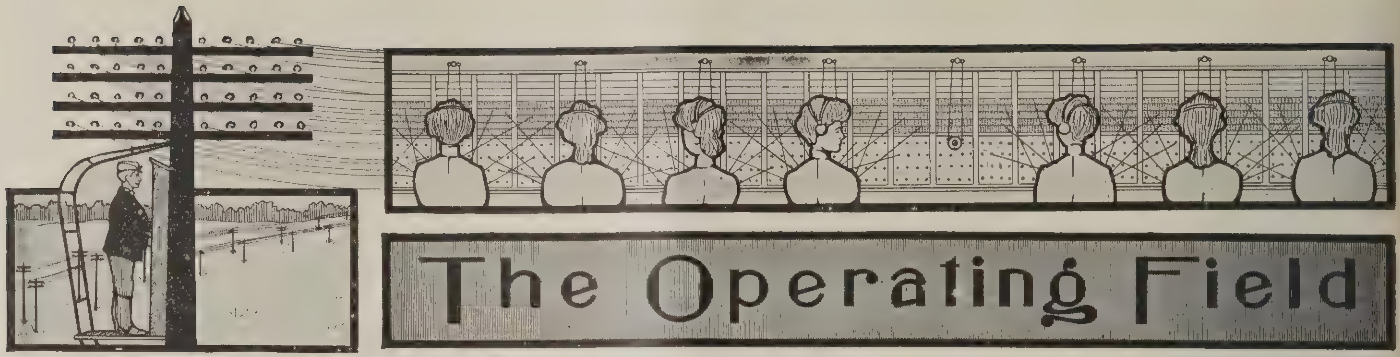
TELEPHONIC evolution is so rapid and the changes so radical that one, in view of the things that are, is likely to forget the things that have been, and to consider the present only as meritorious, and the past to be condemned. The systems which are now seemingly obsolete had many points of advantage, some of which it is not well to utterly ignore.

Take for example, the law system, one of the earliest applications, which has been described in a previous issue. Both the central office switchboard and the subscribers' sub-station were considerably simpler than they are to-day. By the use of the order wire the magneto generator was entirely obviated, and in the switchboard the key shelf of the calling and disconnecting signals did not appear. There was absolutely no waiting for the operator, because the moment that the subscriber touched the order wire button he could speak instantly to the operator's ear. Certainly these were points of advantage, and as telephonic art progresses it is not impossible that they may again, in some form or other, be taken advantage of. The weak point of the law system, however, was the order wire itself. When this switchboard prevailed there was no underground construction, and all lines of whatsoever description were aerial. All subscribers in a certain section were supplied with a single order wire which, when disabled, paralyzed the entire group. This is the chief criticism to be offered against the Law system. As there was no means of signaling the central office, excepting by the order wire, when it opened, it incapacitated every subscriber in the group, and made it necessary in order to notify the office, either to visit it in person, or go to some other group of subscribers whose order wire was intact.

Again, subscribers sometimes became impatient, as they still do, and perhaps two or three attempted simultaneously to give their orders, which, of course, resulted in an inextricable confusion. The Law board also proved itself somewhat inflexible. With the signal board three or four calls may come in at once, operating the lamps or annunciators, as the case may be, and the operator will answer one after the other as rapidly as she can, but with the call wire plan but a single order can be transmitted and received at a time, and all others must wait their turn.

Listening to Mr. Balfour in London. See "Foreign Currents" Page of This Issue.

These seem to be the chief reasons which have caused the Law board to come into disfavor, although it proceeded abroad after its use was discontinued in this country. There are, however, some places to-day where the Law system might not be amiss. In small exchanges, where subscribers are not impatient and excessively busy the Law system affords a solution whereby it would perhaps be possible to build and operate telephone plants much less expensively than is at present necessary. So that installations of this kind might be used where the more expensive type of lamp switchboard could not be made a profitable investment.



The Operating Field

THE EXCHANGE AT MILFORD, IND.

A YEAR ago there was a Bell exchange with about 100 subscribers at Milford, Indiana. An Independent company was organized and on Jan. 1, 1903, began giving service to about fifty subscribers. This soon grew to a hundred, and by the harvest time was near to two hundred. Milford is a town of only about one thousand inhabitants, and as the new company built farmers' lines in all directions and connected over toll lines to all surrounding towns, many of the old subscribers changed from the Bell to the Independent. While the new company was rapidly increasing its list the old's list was as surely declining, and its subscribers so completely deserted it that there were but a couple dozen left, and recently the Bell exchange was entirely discontinued. The new company is incorporated as the Royal Telephone Company. It was organized by L. M. Neher, who is manager of the company.

The Royal Independent Company now has about 250 subscribers and expects to have 300 by the end of the first year. They give free service to all subscribers to the towns of New Paris, Syracuse, Millersburg, Oswego, Hastings, Leesburg and Milford, and a five cent rate to the county seat—Warsaw. They also have arranged for a 10 cent rate to all other places in Kosciusko county. They have built five toll lines and have long distance connections in every direction. The rapid growth of this company may be attributed to two things. In the first place, farmers in every direction were connected on the exchange, and in the second place a special inducement was made to secure influential farmers on every line as stockholders in the company. That was done in this way. The rental rate of telephones is $1.00 per month, but to every one taking one share of stock ($50.00) a half rate was allowed, i. e., stockholders pay but 50 cents per month for services which cost others $1.00. Mr. Neher claims to be the originator of this idea, and it certainly has been a good one for the place, as it not only brought forth plenty of local capital for the company but it gave the company such a wonderful strength and influence that the Bell exchange of about 100 subscribers was reduced to a toll station in ten months. The farmers' lines are built with about ten subscribers to the line and the instruments used are of the best bridging type, so constructed that any subscriber can call any other on his own line without calling central, and on the other hand any subscriber can call central without calling any other on the line. The party line rings do not come in to central. The company is now building a toll line from Milford through Leesburg and Oswego to North Webster, a distance of 16 miles.

INDEPENDENTS AHEAD AT ROME, N. Y.

By W. H. Campbell, *Special Correspondent,*

EVERY indication is shown that there will be a telephone rate war in Rome, N. Y., in the near future, as the Central New York Telephone Company has made, and is still making, arrangements to regain some of the business which was taken away by the Independent company. The Bell people have secured a five years' lease on a new exchange room, and will at once install a switchboard with a capacity for over one thousand subscribers. The work of placing the new equipment will be commenced immediately. At the present time the Independent company has over one thousand working telephones, and the contracts are being received at an encouraging rate. When the Independent company opened for business the Bell people had 500 telephones, but soon the superior service and lower rates, together with the courteous treatment of the Independents was evidenced, and gradually the number of instruments operated by the Bell people dwindled down to 75, its present number. Manager Udell of the Independent company says the opposition will have to show some purely original ideas before there is a falling off in the receipts, because the merchants are standing by him and appreciate what Independent capital has done for the city. Nearly every merchant in Rome will say that the Bell company gave very poor service before a rival company was started, and add that they will not soon forget it.

TELEPHONE ENGINEERS—ATTENTION.

THE London Electrician has in course of preparation its forthcoming (1904) edition of *"The Electrician" Electrical Trades Directory and Handbook* and desires all who are engaged in electrical pursuits to forward their names, professions and addresses for insertion. There is no charge connected with the insertion of such a notice in the directory. The publishers are quite anxious to make the directory as complete as possible and have it contain the names of all American telephone engineers, and therefore request those who are engaged in this line to mail the above mentioned information to them. Address, *"The Electrician," Electrical Trades Directory and Handbook,* 1, 2 and 3, Salisbury Court, Fleet Street, London.

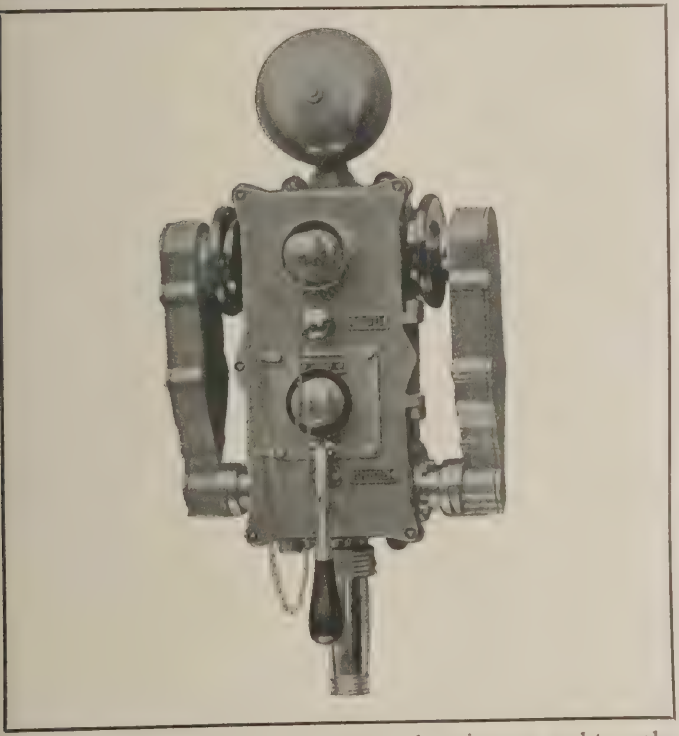
TOLEDO COMPANY WILL KEEP ITS MANAGER.

A WELL defined impression prevails that the directors of the Toledo Home Telephone Company, at the next meeting, will formally refuse to accept the resignation of General Manager R. E. Hamblin. It was reported that the board had already so decided, but it appears that there has been no regular meeting of the board at which such a question could be settled. The directors regard Mr. Hamblin as a very valuable man for the position, and it is generally believed that at the regular meeting in November they will decide to employ an expert electrician, who will occupy the position of assistant to the general manager. Mr. Hamblin is not an electrician, and it is claimed that this fact has to some extent influenced his resignation. Mr. Hamblin, however, declines to give any reason for his action.

A TELEPHONE TRAGEDY.

WOVEN into the tragedy in the lonely manor house at Dingman's Ferry, Pa., where Victor E. Bevans and his wife, Mary, were shot by an assasin lurking in the darkness outside is the extraordinary part played by the telephone, which notified the neighbors, miles away, of the fearful act in the Bevans home. His wife dying, himself nearly unconscious, Bevans staggered to the party telephone used jointly by fifteen families scattered for miles around. One turn of the crank rang the bell on every telephone in every house. With the last ebbing effort of strength, Bevans twisted the handle madly and shouted into the transmitter. Then he sank down, and the receiver was left dangling. Alarmed by the furious ring, fifteen people sprang to their instruments and heard and acted at once. Strange and fearful sounds came from the Bevans telephone. The people far away knew only that a tragedy had occurred. When they arrived at the house there was little they could do. Mrs. Bevans was dead and her husband was in an almost hopeless condition. The telephone had done its duty well, however, and the people round about now even more than before appreciate the value of the instrument.

A NOVEL GERMAN SUB-STATION SET.



THERE are many cases, particularly in manufacturing installations and similar situations, where the ordinary sub-station set is hardly sufficient for the purposes, either because the location in which the set is placed is exposed and the telephone is injured by moisture or other adverse factors, or else the situation is such as to be an extremely noisy one, and to make the use of the telephone difficult or impossible. Some German instruments recently devised are attempts to produce a sub-station outfit which shall successfully meet these conditions, and are shown in the accompanying illustration. With German facility for devising a plan to describe such an instrument, these sets are termed "loud-distance telephone stations." The foundation of the instrument is a substantial cast-iron box, which is fitted with a cover carefully faced, and secured to the box by means of triangular screws, and provided with a water-tight gasket. By this means the entire mechanism of the sub-station is rendered both air and moisture proof. On the end of the side of the box is a pipe thread coupling, to which an iron conduit is attached, that carries the circuits in a manner which is also completely moisture proof. The calling signal is a battery bell placed on the top of the case, but so arranged that its mechanism is entirely enclosed, and thus secured from all forms of injury. The transmitter is constructed to be as powerful as possible, and at the same time to be free from side tone. Two receivers are arranged, one on either side of the instrument, and can be let down to be placed against the ears. These are attached to pivoted arms, so that when out of use they may be swung up against the side of the case and out of harm's way. The arms are independently adjustable, so that both of the receivers may be placed in close proximity to the ears of the listener. The advantages of a sub-station set of this description in mining operations, boiler shops, manufactories of all kinds, and on shipboard, is self-evident.

HANDY EXTENSION ARRANGEMENT FOR A DESK SET.

WHILE the method here given of wiring to accommodate an an extension desk set in two different parts of a house is not new, it may serve to refresh it in the minds of some and it may be available for reference to others. There are cases where a subscriber of a telephone company desires a telephone desk set arranged in his residence so that in daytime he can have the instrument downstairs and at night upstairs, and yet have the one instrument.

A very convenient arrangement is shown in the drawing at the bottom of the page. Place the bell box in a convenient place where it can be heard all over the house. Then run three (3) wires from posts *1*, *2* and *3* on the bell box to points *1*, *2* and *3* at the jack No. 1 downstairs, and run three wires to jack No. 2 on the second floor, which can be in the bedroom, and then by connecting *1*, *2* and *3* points of the cord on the stand set of instrument to plug points *1*, *2* and *3*, the telephone can be used in either place by inserting the plug in the proper jack. The bell will ring for the subscriber whether the plug is in the jack or not. The arrangement is for a common battery station only.

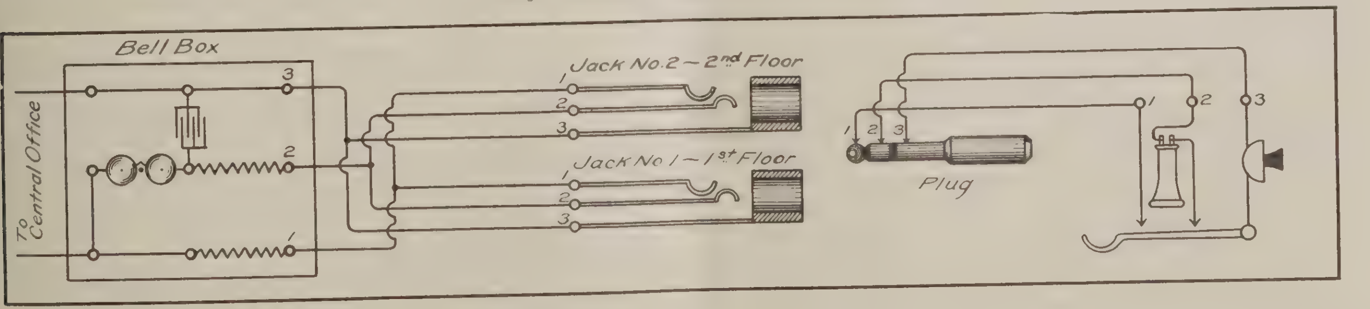
VALLEY CO. IN MICHIGAN IS PROSPEROUS.

A QUARTERLY dividend of 2 per cent. has just been declared by the Valley Telephone Company of Saginaw, Mich. This is the twentieth dividend the company has paid. The collections of rentals were started on the first day of October, 1898. During the present season the company has sold $50,000 worth of stock at par out of its treasury, the money being used in extensions. The principal extensions being copper and iron circuits from Flint westerly to Durand from Saginaw, southeast to Marlette and from Saginaw northeasterly to Cass City, taking in a large number of prosperous villages en route, having added 113 miles of toll lines and 287 telephones aside from the usual growth in the cities which it occupies.

OHIO MANAGERS MEET.

INDEPENDENT telephone managers from several sections of Ohio held a secret meeting in Columbus recently, to consider plans for the extension of their several districts. Those present were: W. F. Crossley, of the Columbiana County Telephone Company, Salem; W. Gilbert Thompson, Lebanon; A. J. Doudna, Bridgeport; Jerome Penn, Washington C. H.; E. E. Knox, Portsmouth; Walter Green, Cleveland.

A Handy Extension Arrangement for a Desk Set.



The Editor's Page

AN EXAMPLE OF BELL DOGGEDNESS.

THE most important and interesting news in telephone circles during the month was the delayed decision in the suit brought by the Western Union Telegraph Company against the American Bell Telephone Company. This suit well illustrates the methods of the Bell concern. "For ways that are dark and tricks that are vain" this great monopoly double discounts the "heathen Chinee," immortalized by Bret Harte. Incidentally it emphasizes the reasons why the Independent companies have been able to make such tremendous headway against the combined opposition of the Bell interests. Years ago, when the telephone was regarded as a luxury for the favored few only and not as a great public utility which would soon reach out to every household in the land, the Western Union Company abandoned the telephone field to its rival and made over certain patents, in return for which it was to have 20 per cent. of the gross royalties and rentals of the Bell lines.

Under ordinary circumstances a 20 per cent. handicap would have proved fatal. Not so with those astute Boston financiers. They could not sandbag their great rival, so they cooked up a plan to get around the obstacle. They conceived the brilliant scheme of organizing subsidiary companies, and, not content with a paltry 20 per cent. which they thus saved themselves from paying the Western Union, they robbed the latter of their share of the stock in these subsidiary companies. This stock, they contended, was not part of the royalties of the Bell company and did not have to be divided. The Boston financiers drew their dividends regularly, and complacently stowed the money away in their inside pockets.

The plan was an excellent one. The only trouble was that it did not work. The Western Union Company was unkind enough to demand a fifth of the stock and to bring suit for an accounting. This was twenty years ago. During twenty years have the Bell people kept this matter in the courts, interposing all of the law's delays which astute attorneys could conjure up. During 20 per cent. of a century has this 20 per cent. contention been thrashed through the courts, and the end may be not yet. True, the United States Circuit Court of Appeals has reversed the decision of the lower court and ordered an accounting, and from this decision there is no appeal. But the higher court can take up the case and reopen it if it sees fit. Whether it does or not remains to be seen, but a weaker rival would have long ago been worn out with the protracted and expensive struggle. In the end the Bell people, who have danced, must pay the fiddler. They will have to pay a fifth of their unearned millions over to the Western Union concern.

The millions of dollars involved are enough to take the breath away from ordinary litigants. The American Bell Telephone Company actually holds some eighteen million dollars worth of the stock of these subsidiary companies, to say nothing of the unearned millions which have been paid them during the years of the contract with the Western Union. That tells the story why these companies are not successfully meeting the vigorous competition of the Independent operators. Eventually one-fifth of this enormous sum, both stock and dividends, will have to be turned over to the Western Union Company. Meanwhile the American Bell Telephone Company itself is in a bad way for ready money, because the litigation has affected the sale and value of its stock.

THE LESSON IT TEACHES INDEPENDENTS.

All this greatly interests the Independent operators, but is important only as it illustrates the methods of the Bell people. It demonstrates conclusively what may be expected in the suit brought by the minority stockholders of the Kelloggg Switchboard and Supply Company to set aside the unholy sale of the Kellogg concern to the Western Electric Company interests. The matter will be delayed in the courts as long as it seems profitable to the Bell company to so delay it, and there is absolutely no prospect of the sale being set aside. The Kellogg concern is owned and controlled, body and soul, by the Bell people. What can Independent companies expect from a concern like that? Yet, it continues to pose as an Independent company, offering its goods to Independent operators on an alleged cold-blooded business basis, regardless of what the future may have in store. The Independent operators are a keen set of men. They will not deliberately plan their own undoing.

It does not stand to reason that Independents are going to purchase the Kellogg equipment, when it is very evident that it is only a question of time when the source of supplies will be cut off. The Kellogg company will exist only as long as it can be used as a club for pummeling the Independent operator and frightening off competition. As soon as the mask is thoroughly torn off, revealing the horns and cloven hoofs, it will be absorbed by the Bell concern that already absolutely controls it. This ownership has been admitted. The claim is made that it makes no difference, and the Kellogg concern continues to pose as practically Independent. "What of it?" they say in effect. "What difference does it make who manufactures a telephone or a switchboard so long as it is what you need?" Notwithstanding this contention, the Independent operators are not putting themselves into the power of the enemy to any alarming extent.

"What do the Independents think about it, and what do they propose to do?" asked THE AMERICAN TELEPHONE JOURNAL of one of the largest of these Independent operators. "What we think about it wouldn't look well in print," was the reply. "What we propose to do is this: We propose to let the Kellogg company severely alone. There are plenty of Independent manufacturers. We do not have to patronize a Bell concern." This is the course which THE AMERICAN TELEPHONE JOURNAL has pointed out from time to time as the part of wisdom. Let the Kellogg company come out into the open for what it really is—a Bell adjunct—instead of assuming a false position before the business world. A wolf in sheep's clothing has greater possibilities for harm than a wolf which goes forth in his own person in search of his breakfast.

FOREIGN CURRENTS

By "The Arrester."

GREAT BRITAIN is just now being deluged by a flood of political oratory on the question of the day—fiscal policy. The telephone had a good inning on the very opening day of the campaign, as Mr. Balfour's speech at Sheffield, in which he outlined his general ideas on the new British policy, was heard in London by telephone, by a large gathering of listeners. There is in London a concern called the Electrophone Company, which makes a specialty of turning on theatrical and musical performances by telephone. A telephone subscriber in London, on payment of a small extra subscription, is supplied with an outfit of specially constructed double head receivers, by means of which several people may listen to the current theatrical attractions without leaving their armchairs or abandoning their after-dinner cigars.

How It Was Done

THE Electrophone Company has footlight transmitters installed at the principal theatres and concert halls and these are connected to a special exchange, by means of which any telephone subscriber entitled to electrophone service may be connected to any theatre. It has been proposed to extend the electrophone service to the law courts and to the House of Commons. So far this has not been done, but a start in this direction was made by the transmission of Mr. Balfour's Sheffield speech to London, where, at the Electrophone Company's headquarters, every word of it was clearly heard by a party of twenty-four journalists and others. It is said that the transmission was so good that several of the reporters took down the speech *verbatum* in London. On several occasions when Mr Balfour's voice became tired and he apologized to the audience in the great hall where he was speaking for not making himself better heard, very word was still heard so well over the telephone that the apology had a distinctly curious effect to the London listeners.

The Electrophone Installation

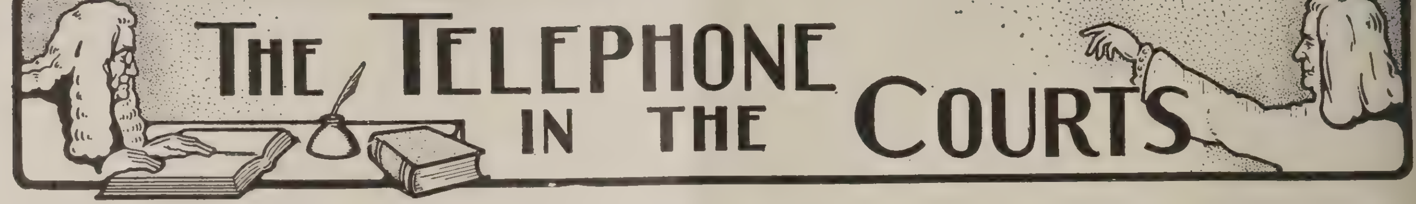
THE installation at the transmitting end consisted of six special electrophone transmitters placed on the table from behind which the Prime Minister spoke. These are granular transmitters of a special type, so arranged that there are two granular carbon chambers in series, thus allowing of high battery power being used. The battery for each transmitter was six cells of storage battery, giving 13 volts. The secondaries of all the transmitters were connected in multiple to the transmitting line which was connected through the various national and Post Office exchanges directly at the distributing frames, thus avoiding the risk of poor contacts or connections, at the switch boards. The double chamber granular transmitters are found to give much betters results than the Ader microphone transmitters formerly employed for electrophone purposes; while quite as sensitive as the microphone arrangement the granular transmitter is found to give better quality of transmission. Only two transmitters were actually used for sending the speech, the other four being in reserve. At the receiving end twenty-four pairs of head receivers were connected across the line in two series of twenty-four instruments each, one receiver of each pair being in each series. The whole installation seems to have been so carefully organized that it fully deserved the complete success attained. A similar experiment on the occasion of Mr. Chamberlain's great speech at Glasgow was not quite so successful, partly because Mr. Chamberlain stood at the side of the table and occasionally turned his back entirely on the transmitters and partly because some careless—or malicious reporters used some of the instruments for hat pegs!

Glasgow Again

THERE may be cheers at Brighton, but there must be weeping and gnashing of teeth at Glasgow. The municipal system there is now receiving particular and most embarrassing attention at the hands of the technical press. It is pointed out pointed out in a series of articles appearing in the *Electrical Review* that instead of there being over 9,000 subscribers in the Glasgow municipal system, as freely announced in Glasgow, there are in reality less than 7,500—the balance being made up of extension and private line stations. It is further shown, by means of figures taken from the official accounts and statistics, that the actual cost of construction has been nearly $175 per subscriber's line as against the estimated cost of $115, making a total excess of actual over estimated cost of some $440,000, as the system stood at May 31 last, when the accounts were made up The *Review* makes a very complete and clear case in proof of its arguments, as its figures for the capital cost are those given in the official accounts and it also publishes tables of statistics giving the exact number of stations of various classes, also taken from the official report, from which it is evident that the total of 9,122 stations of all classes represent but 7,441 actual subscribers' exchange lines. The total capital cost is $1,350,000. The value of the various extension and other sundry stations is put at about $55,000, leaving the capital represented by the 7,441 exchange lines at $1,295,000, an average per line of about $175. The original estimate was $95 per working line, or $115 per line including a proportion of plant for future use. The *Review's* figures include spare plant.

A New Municipal Exchange

A MUNICIPAL telephone system has just been "officially inaugurated" at Brighton, one of the most famous seaside resorts in England. The ceremony consisted in the Mayor calling up one of the Councillors, who seemed to be a theatre proprietor, and exchanging some (presumably) foolish remarks with him. It is gratifying to learn that "the good wishes expressed at both ends of the line were heard with perfect distinctness." Evidently telephony is making great progress in England. Regarding the technical details we learn from the *Electrician* that the exchange is on the "ring-through" system combined with automatic calling and clearing," the arrangement being such that when the subscriber lifts his instrument from the switch hook the calling signal is automatically given in the exchange, and the clearing signal is similarly transmitted automatically when he replaces the instrument." Truly British municipal telephony is making rapid strides, but we should imagine that a combination of automatic signalling and ringing through is likely to give rise to a few novel difficulties. The cable system starts with 312 pair cable at the exchange, gradually diminishing to six pair at the distributing points. The switchboard is at present fitted for 1,000 subscribers, with an ultimate capacity of 5,000. It is said that the number of applications has already considerably exceeded a thonsand, so that the extension of the board is to be proceeded with at once. The rate for unlimited service is $27.50.



THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

OBLIGATIONS HAND IN HAND WITH PRIVILEGES.

I AM about to buy a telephone exchange which has been operated by a corporation under a franchise granted by the village trustees. Now if I buy this company out and continue to operate this exchange, will I be bound to carry out contracts with subscribers made by the company before I took it? Will I be liable for an accident that happened while they managed it?

W. S. S.

IF you buy the exchange and continue to operate it under the franchise held by your predecessors, you will be bound by the terms of their franchise. Buying with knowledge of the franchise, you cannot enjoy the benefits thereof without assuming the coincident obligations. You will therefore be bound to carry out the service contracts made by the company before you purchased. Mahan vs. Michigan Telephone Co., 93 N. W. 629. Liability for accidents happening under the previous management depends largely upon the language of the franchise and the contract of purchase. Unless there is some provision in the franchise concerning liability for accidents, or unless you actually agreed to be liable therefor, I think you would not incur any such liability by your purchase. The corporation was the wrongdoer and must pay for its negligence. Liability for a tort or wrong is not a debt until placed in judgment. The company cannot transfer to you its liability by the sale unless you expressly assume it.

FREE SERVICE TO THE CITY VALID.

MAY a city impose as a condition in granting a franchise that our company shall furnish free service to the city officers? Please give me an answer as soon as possible.

S. A. H.

THERE is no doubt of the validity of such a condition. If you accept a franchise containing such a clause, it becomes a binding contract. New Orleans v. Great Southern Telephone and Telegraph Company, 40 La. Ann. 41, 2 Am. Elec. Cas. 122.

RIGHTS MUST BE EXPRESSLY CONFERRED.

THE city council has passed an ordinance giving us permission to string our wires across the streets and from housetops when we get the owner's consent. We have spent a good deal of money geting the consent of householders and find it necessary to put poles in the street to build our line. The city authorities say we have no right to put up our poles. Does not the ordinance give us the right to do so, especially when we have spent money relying on it? The state law (of New York) says a telephone company may build its line over the public streets if it gets the owner's permission.

H. B. M.

THE ordinance does not give you the right to erect poles in the street unless it so expressly provides. You acquired no rights beyond those directly specified or which follow as a necessary incident to the construction of your line in accordance with the terms of the grant. The erection of poles is not necessarily incident to the stringing of your wires across streets and from housetops. The fact that you have spent a good deal of money does not change it, because the investment of money in reliance upon a right you did not have cannot confer the right. Neither would the State law protect you. The city undoubtedly has authority by charter to regulate the use of the streets. The State law would not repeal the charter provision unless it so states in express terms. Utica vs. Utica Telephone Co., 48 N. Y. Supp. 916. You will have to secure permission to erect your poles by a further city ordinance.

BELL COMPANY V. INDEPENDENT AGAIN.

NOTICE of an application for an injunction has been filed in the Circuit Court at Moline, Ill., by the Central Union Telephone Company to restrain the Union Electric Telephone Company from building a line from Rock Island to Milan. In its application the Central Union Company insists that it has acquired a right of way on both sides of the streets in Rock Island along which the Union Electric Company has commenced to build, and that the latter cannot acquire a right of way by the condemnation proceedings it has instituted. The Central Union Company is a Bell company, the Union Electric Company an Independent. The proceedings are particularly embarrassing to the defendant, because its franchises and contracts contain clauses providing that service at the rates charged should include the use of country as well as city lines. The aim of the Bell company is evidently to prevent its rival from reaching the farming community and giving city subscribers free service to the country not offered by the Bell company.

TELEPHONE TROUBLES IN OKLAHOMA.

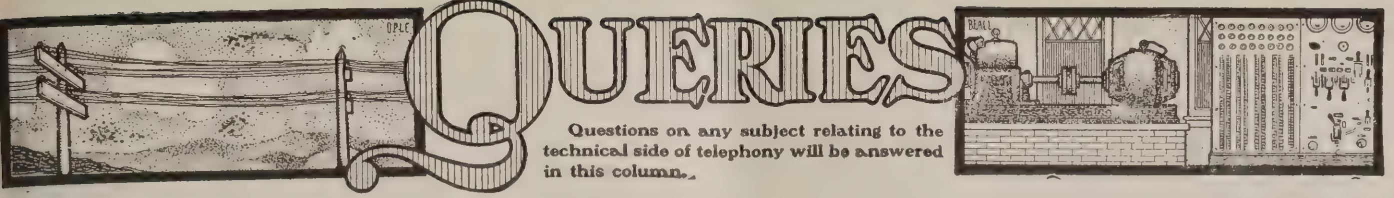
SUIT for $10,000 against the Guthrie Telephone Company and the New Electric and Gas Light Company has been begun by the wife of the late Robert S. Bland, who was suddenly killed while working on a telephone pole by a live wire belonging to the Electric Light Company. The Guthrie Telephone Company allowed the Electric Company to put one of their wires on this pole, and Bland, being a new man and not having instructions as to the day current, which was on at the time, ascended the pole to work on the telephone wires. In some way he came in contact with the electric light wire, which was poorly insulated, and met sudden death. It is claimed this was due to negligence on the part of the telephone and electric light companies.

WIRES TOO CLOSE TO THE GROUND.

JOHN I. SABIN, president of the Sunset Telegraph and Telephone Company, of Berkeley, Cal., has been arrested on the complaint of a house mover, charged with suspending the company's telephone wires less than twenty feet from the ground, the height required by city ordinance. The defendant's attorney has demurred to the complaint on the ground that the facts recited therein do not constitute a public offense.

VERDICT FOR VIADUCT MANUFACTURING CO.

THE Viaduct Manufacturing Company has secured a verdict against the Eastern Telephone and Telegraph Company in the Circuit Court at Camden, N. J. The object of the suit was to recover the price of a lot of telephone fixtures sold to the Telephone Company on September 22, 1900.



Questions on any subject relating to the technical side of telephony will be answered in this column.

COMMON BATTERY INDUCTION COIL.—(222.)

Why is it that when points 1 and 2 of the induction coil (Fig. 222) are reversed it will reduce the receiving, in fact, some times you cannot hear at all? Please explain the cause of this. Please explain also why the receiver circuit is connected through the condenser. Would it be possible to receive if the condenser was open? R. N. H.

The common battery circuit, as it is usually arranged, is shown in Fig. 222, in which B is the common battery, and L and L' the two sides of the line. The primary of the induction coil P is connected across the line between the points y and z, and usually has a resistance of about *17* ohms. The ringer, usually a thousand-ohm bell, is connected between the points z and x, having in series a two microfarad condenser. The transmitter is placed in the L' side of the line between the point x and the point y, which is the end of the hook switch. The secondary of the induction coil, usually about *14* ohms, is connected from the point v between the bell and the condenser in series with the receiver to the hook switch. The ends of the coil marked O and O' are termed the outside ends, while the other ends marked i and i' are the inside ones. Both coils are wound in the same direction upon the core. Suppose the transmitter T to be at rest. It has a certain fixed resistance. Current will flow from the positive side of the battery through the secondary winding p in the direction of arrow *No. 1*, through the hook contact, through the transmitter T, and to the negative side of the battery. Between the points x and y there will be a certain electrical potential depending upon the resistance of the remainder of the circuit. The condenser will soon be charged to the same potentials that exist between x and y, and the directions of the charge will be as shown. When the transmitter is spoken into its resistance is suddenly lowered, the potential between x and y is reduced, and the discharge from the condenser will now take place through the primary P, receiver R, and the hook switch H. This passage will be in the direction of arrow *No. 2*, and will cause a current to be induced in the secondary winding in the direction of arrow *No. 3*, or in the same direction as that which the battery current has taken, and will consequently aid and reinforce the current. When the transmitter returns to its normal position, the potential will be raised between the points x and y. Current will, therefore, flow into the condenser from the point y, through the primary winding p in a direction opposite to arrow *No. 2*, and thence to the condenser and to the point x. An induced current will be generated in the secondary winding s in a direction to the opposite of *No. 3*. This current will oppose the main line current, but on account of the increased resistance of the transmitter, this current is a decreasing one. From this explanation it will be seen that when the induction coil is connected, as shown, the induced currents, when the transmitter is spoken to, are in the same direction as the battery current, and reinforce or aid them, whereas, if the ends of the coil were reversed the induced current would be opposed to the battery current, and it is conceivable that if the two were exactly equal, one would neutralize the other, and it would be impossible to hear at all. While the explanation we have given is for a circuit slightly different from the one you sent us, you can easily apply the principle to your own circuit.

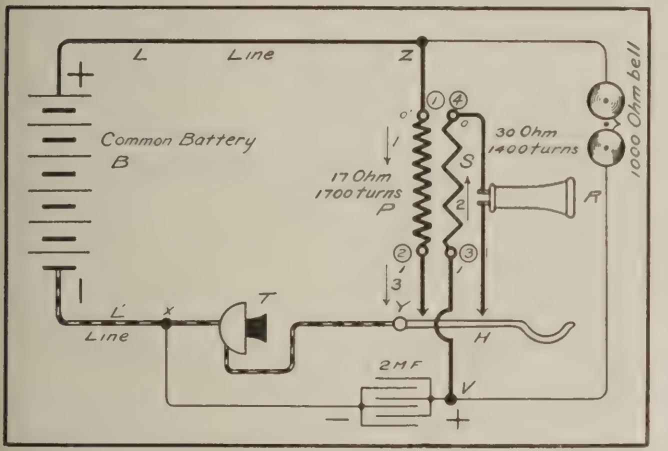


Fig. 222.

In the circuit that you show we do not think that it would be possible to receive if the condenser was open.

DIAGRAM OF SWITCHBOARD KEY.—(223.)

Will you please send me a diagram of a switchboard key that will cut out the calling plug and the operator's set when the key is in the listening position? T. A. N.

We judge from your query, that the key you require is one which will enable an operator to listen on either the front or back cord, at the same time breaking the connection between the two cords. Such a key and circuit arrangement, is shown in Fig. 223. The key consists of two parts, operated by the same plunger, which is normally in a central position, thus retaining the springs of the key in the position shown in the diagram, the operator's telephone being disconnected from the cord circuit, The movement of the plunger to one side or the other serves to break the contact between the inner and central springs of the key, and to bring the central springs into contact with the outer springs, thus connecting the operator's set to the desired cord and breaking the connection between the two cords.

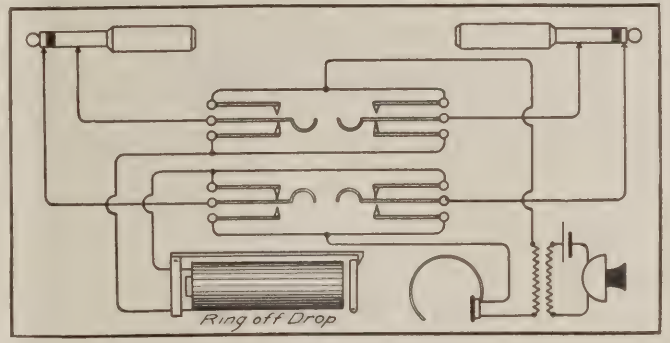


Fig. 223.

QUERY ABOUT WIRE.—(224.)

I have noticed in descriptions of some telephone plants that I have read lately that in the central parts of the towns copper wire was used for circuits, and in the outskirts iron wire was used. Will you please tell me why the two kinds are used? N. T. I.

The copper wire was used in the center of the town because there would probably be more corroding influences (smoke, gases and acid fumes) in that portion than any other. None of these agents would affect the copper but would quickly rust iron. In the residence portions of towns where there is little to cause corrosion, it has been found that iron wire lasts so long that in some instances its use is profitable.

PORCELAIN AS AN INSULATOR.—(225.)

Is porcelain a good insulator, and if it is, why is it not used for telephone lines in this country? L. A. T.

Thoroughly vitrified porcelain makes one of the best insulators and is largely used in England and on the Continent. The surface resists the formation of a continuous film of moisture and is easily washed by rain. Good porcelain is tougher than glass but its opaqueness is a disadvantage as the dark cavities under the skirts favor the formation of cocoons and spiders' webs and the accumulation of dirt. Porcelain is much more expensive than glass. This is one of the greatest reasons for its infrequent use in this country.

PATENTS ISSUED

IMPROVED RELAY.

W. W. Dean, of Chicago, Ill., patents (No. 741,115) and assigns to the Western Electric Company, of Chicago, an improved relay. The object of this invention is to provide a relay which will respond to the alternating currents used in signalling sub-stations. There is a U-shaped pole piece b fastened at the rear of the magnet spool a'. The arms of this U-shaped piece pass a considerable distance in front of the coil and enclose it. The armature is a heavy rectangular piece of iron e, pivoted on the trunnions e' that are inserted in the projecting ends of the pole piece. These trunnions are located in a plane which passes through the center of the magnet core, and thus the axis of rotation of the armature is at right angles with the core. The trunnions are placed approximately in the center of the armature, the stop $e2$ and the contact post g, making the inside of the armature heavier than the outside and causing it to normally rest as shown in Fig. 2. The rotation of the armature is limited by the stop f. There is a contact point g and contact spring g' which enables this device to act as a relay by closing the exterior circuit. By this construction a relay is secured which acts sluggishly, but positively under the action of pulsating currents.

Fig. 1.

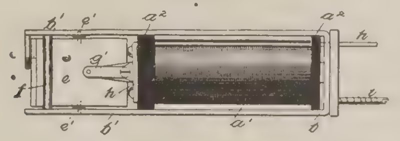


Fig. 2.

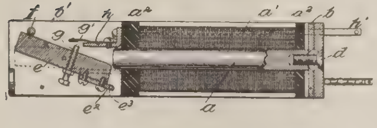
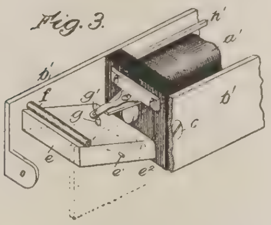
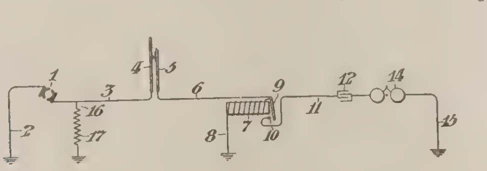


Fig. 3.



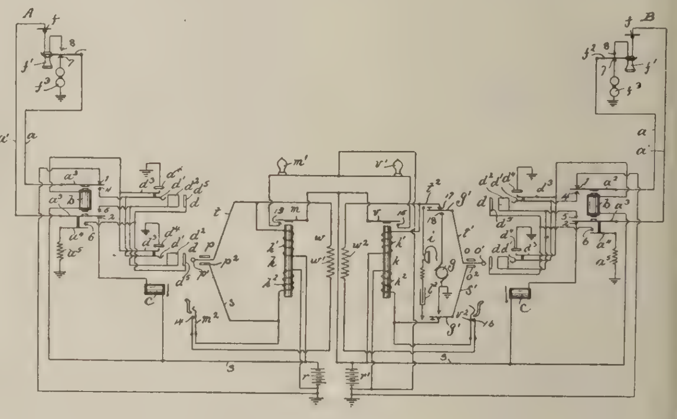
IMPROVEMENT IN RINGING CIRCUITS.

David Stakes, of Philadelphia, Pa., patents (No. 741,847) and assigns to the Keystone Telephone Company of Philadelphia, an improved method of ringing circuits which contain condensers. The circuit is illustrated diagrammatically in the figure. This improvement relates particularly to circuits wherein switch relays are controlled by the operator to connect any subscriber's line with ringing current. In such circuits when condensers are used, there is an objectionable vibration to the relay armatures, and it is the object of this invention to obviate this difficulty. In Fig. 1 the ringing current generator *1* is connected by wire *3*, with the switch contacts *4* and *5*, thence by wire *6* to the relay *7* that has a ground connection *8*. By means of the relay armature *9*, current is delivered to condenser *11* to operate the bell *14*. Mr. Stakes introduces in wire *3* a ground connection *16*, which bridges the opposite sides of the circuit through a non-inductive resistance *17*, preferably greater than that of the relay *7*, but as this resistance is non-inductive, it discharges the condenser with greater facility than the relay coil, and hence is claimed to prevent the chattering of armature *9*.



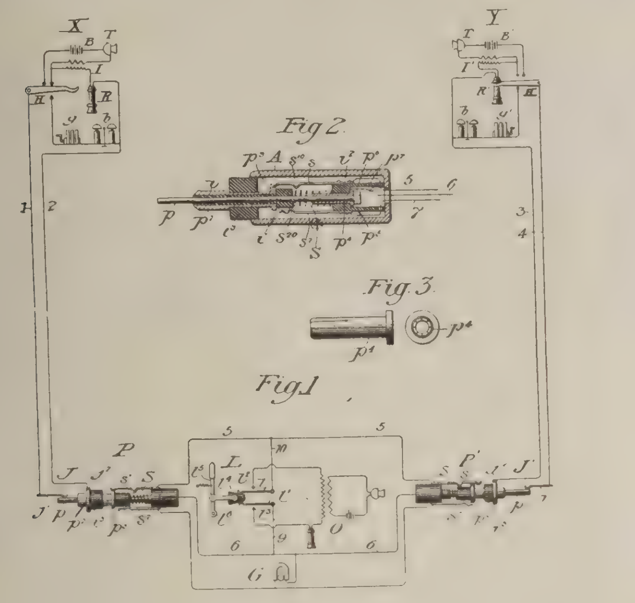
COMMON BATTERY SWITCHBOARD CIRCUIT.

Mr. Kempster B. Miller, of Chicago, patents (No. 741,807) and assigns to the Kellogg Switchboard & Supply Co., of Chicago, an improved common battery switchboard circuit. This patent is a modification of a very similar patent filed by Mr. Miller in 1901, and noted in a pervious issue. The invention is shown in the figure. A and B are the subscribers' sub-stations which are connected to the central office by the lines a and a'. At the office there are two batteries, r and r', one of which supplies the subscriber A and the other the subscriber B. The supply of current to each sub-station passes through a repeating coil, whose windings are w and w', and a pair of impedence coils h and k. These impedence coils serve also as supervisory relays. In the earlier patent of Mr. Miller's a condenser is used to prevent battery current from flowing through the windings of the repeating coil. In the present patent plug and switches $m2$ and $v2$ are used for this purpose, and the circuit through the repeating coil opened as soon as the operators return the plug after conversation is completed. In all other respects this circuit is similar to that of the earlier patent which we have already described.



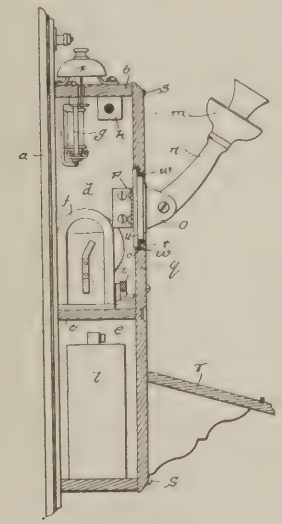
IMPROVEMENT IN SWITCHBOARD PLUGS.

Spencer Prentiss, of Washington, D. C., patents an improvement in plugs to be used upon telephone switchboards. This invention is shown in Figs. 1 and 2. X and Y are two sub-stations connected with the central office by the lines *1*, *2*, *3* and *4*, which terminate in jacks J. The elements of the cord circuit are shown at plug *7*. Mr. Prentiss' invention consists in making the plug in two parts, one of which is movable with reference to the other. The rear of the plug carries two contact springs s and $s2$, which are connected to the ringing generator. When the handle of the plug is pressed firmly these springs slide forward and place the ringing generator in circuit with the contacts of the plug *p1* and *p2*, thus the object of this invention is to add to the ordinary plug the functions of the ringing key, and by this means the switchboard cord shelf may be simplified by the omission of the ringing keys.



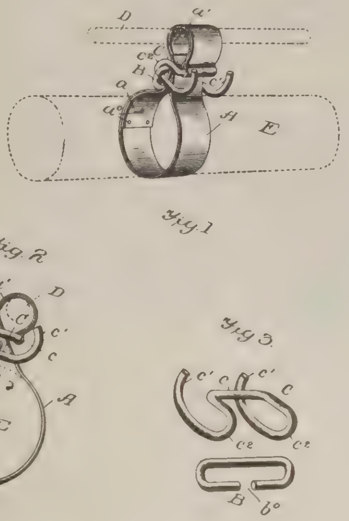
TELEPHONE SUB-STATION MOUNTING.

Hart F. Farwell, of Chicago, Ill., patents (No. 741,899) and assigns to the Home Telephone Mfg. Company, of Chicago, an improvement in the method of assembling sub-station apparatus. Mr. Farwell's invention is illustrated in the figure, from which it will be seen that the transmitter, instead of being bolted to the wood-work that carries the sub-station set, is secured to a bracket *P* which is independent of the front of the sub-station set. In the front board a hole is cut, through which the transmitter protrudes. This hole is so shaped as to closely fit the transmitter base, and is made dust-proof by being packed with felt. By this means it is possible to remove the front board without disturbing any of the apparatus, and thus it is easy to inspect all parts of the set. This device does away with hinges in the sub-station set which have always been a prolific source of open circuits.



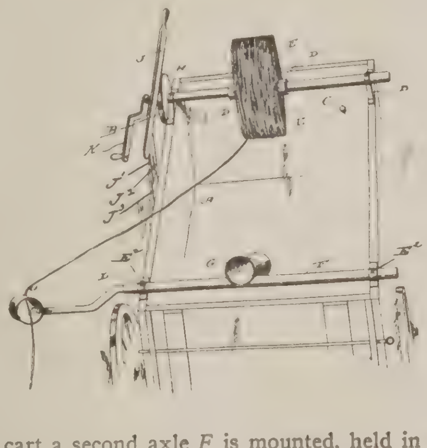
CABLE HANGER.

Justice J. Smith, of New York, N. Y., patents (No. 740,326) an improvement in hangers for aerial telephone cables. This is illustrated in Figs. 1 and 2, Fig. 1 showing the cable suspended by means of the hanger, while Fig. 2 an end elevation thereof. There is a strip of sheet metal (preferably zinc) A, furnished with two eyes, as shown in Fig. 2. Two wire clamps are made as shown in Fig. 3. The clamp *B* is inserted in one eye of the strip, the clamp *C* in the other, then the clamp *C* is inserted in the clamp *B* and turned over. This locks simultaneously the strip of metal on the cable and on the suspension wire.



DEVICE FOR HANDLING WIRE.

David H. Steel, of Oronoque, Kan., patents (No. 740,328) an improved method for handling wire during the process of stringing. This invention is illustrated in the figure, from which it will be perceived that an axle *C* is mounted upon a cart in the bearings *B B*. This axle handle carries a reel of wire *E*. The axle is further supplied with a crank and to control its motion, on the rear of the cart a second axle *F* is mounted, held in the bearings *E2*. This axle carries two guides *O* and *G* through either of which the wire can pass and by which it is guided in any direction that the operator of the contrivance may desire.



THE STREATOR, ILL., COMPANY.

A TOLL line system is now operated by the Streator Independent Telephone Co., of Streator, Ill., radiating from Streator. A new copper line runs direct southwest through Rutland, Wenona, Henry, and thence to Pekin, with branch lines touching all the smaller towns; a through copper line to Ottawa, thence north to other towns; a direct line to both Leonore and Ransom, and it is stringing a direct line to Cornell, where it will get connection with over two hundred farmer subscribers, and other toll lines from there south and east. The new Long Distance line between Aurora, Joliet and Streator has been completed, which gives connection with all the towns in that locality, and the people can reach all the principal business houses and residences in those towns over the Independent lines at a very small charge. The line will soon be completed to Bloomington, and will give a through connection there. The new line will probably reach Peoria this year.

The Week's Messages.

FINANCIAL

COLUMBUS, GA.—The Columbus Automatic Telephone Company is giving the Columbus Savings Bank a first mortgage, or deed of trust, to secure $200,000 of 3 per cent. 20 year gold bonds.

SOUTH BEND, IND.—The South Bend Telephone Company, at a recent meeting of the board of directors, declared a semi-annual dividend of 2½ per cent. on the capital stock of $200,000.

SPRINGFIELD, O.—The Springfield & Xenia Telephone Company has given a mortgage in favor of the Cleveland Trust company for $750,000.

FT. WORTH, TEX.—The Ft. Worth Telephone Company has increased its capital stock from $304,000 to $450,000.

FRANCHISES

HEALDSBERG, CAL.—The Healdsberg and Dry Creek Telephone Company has been granted permission to construct and operate a telephone system in this town.

SAN DIEGO, CAL.—H. H. Richards, of Los Angeles, is here in the interests of the Home Telephone Company. He will ask the city council for a franchise.

WESTBROOK, ME.—The Northeastern Telephone Company has been granted a franchise by the council to construct and operate a system here with the provision that certain wires are placed underground.

ST. CLAIR, MICH.—H. R. Baird and W. L. Baker have asked the common council for a franchise to install an Independent exchange. These gentlemen represent the company that will also ask for franchises in the city of Port Huron, Marine City and Algonac.

YPSILANTI, MICH.—Garry Densmore, who, it is understood, is acting in the interests of the company that is constructing a new exchange in Ann Arbor, will ask for a franchise here.

BEAVER CROSSING, NEB.—The Beaver Crossing Telephone Company has applied for a franchise at Milford, Neb.

CRANFORD, N. J.—The Central New Jersey Telephone Company, which is a branch of the Interstate Telephone Company, of Trenton, N. J., has applied for a franchise in this town .

MOORETOWN, N. J.—If a franchise can be obtained, the Farmers Telephone Company, of Mooretown, will construct a system in Delran township in Burlington county.

ROSELEE, N. J.—The Interstate Telephone Company, of Trenton, has applied for a franchise to construct and operate a system here.

LOGAN, O.—The Logan Home Telephone Company has secured the right-of-way for its line from Winona Furnace to New Straitsville.

DENTON, TEX.—The County Commissioners' Court, which is in session here, has granted permission to the Home Telephone Company to erect poles and string wires throughout Denton county.

GREEN BAY, WIS.—The Valley Telephone & Telegraph Company will petition the council at its next meeting for a franchise to construct and operate in this town.

MILWAUKEE, WIS.—John W. Wegner has applied to the city council for a 50 year franchise for the West Shore Telephone & Telegraph Company. The company will be incorporated, and among others in the movement are Leo Torve and Clarence L. Mann.

PERSONAL

HENRY DAVIS, of Tilton, N. H., has been appointed superintendent of the Citizens' telephone system at Tilton and Franklin, N. H.

CHAS. A. FARRINGTON, president of the Centerville Telephone Company, of Centerville, Ia., has returned from Dixon, Ill., where he wedded Miss Teressa Connors.

ARTHUR FORTH, who has been manager for the Southern Illinois Telephone Sompany, at Effingham, Ill., has turned over the position to T. Turner, of Taylorville. Mr. Forth goes to Indianapolis as general superintendent of construction for the Central Union Telephone Company.

H. B. HEWITT, representative of the Stromberg-Carlson Company in Missouri, who was formerly located at Keithsburg, Ill., is now permanently located at Chillicothe, Ill.

FRED W. KELLY, late manager of the telephone exchange at Oskaloosa, Ia., has arrived in Springfield, Ill., to assume the management of the Inter-State Telephone Company.

R. L. M'COY has resigned as manager of the Home Telephone Company, at Rockport, Ind., and will go to Chicago to accept a position. Allen J. Payton will become manager of the company.

E. S. RANDALL has been engaged by the New Sharon and Norridgewock Telephone Company, of New Sharon, Me., as electrician. The company now has over 200 instruments.

ARTHUR SPINKS is now manager of the Beebe Telephone Company, at Searcy, Ark.

MRS. MINNIE TOMLINSON, an operator of the Citizens' Long Distance Telephone Company at Indianapolis, Ind,. recently won the $25 prize for being the best toll operator in the employ of the company.

BURNIE WILHITE is now manager of the Morgan County Telephone Exchange at New Decatur, Ala.

COMBINATIONS

ST. PETERSBURG, FLA.—The F. A. Davis Company, of Philadelphia, of which A. P. Weller is the local manager, has purchased the St. Petersburg Telephone Company.

SPRINGFIELD, ILL.—A syndicate composed of J. H. Culver, of Decatur; E. W. Hight, of Assumption, and J. S. Culver, of Springfield, has purchased the Douglas County Telephone Company, which has about 500 miles of metallic circuit and 800 telephones.

SPICKARD, MO.—The Spickard Telephone Company and the Farmers' Telephone Company have consolidated and will hereafter be operated from one exchange.

VIRGINIA CITY, MONT.—S. A. Hall, representing the Yellowstone Park Telephone & Telegraph Company, owning lines of Gallowton and Park counties, has purchased the Southern Montana Telephone Company, running between here and Norris. He will construct a line and connect it with the Madison Valley Farmers line.

UNDERGROUND

TRINIDAD, COLO.—T. A. Cannon, superintendent of construction for the Colorado Telephone Company, accompanied by his assistant, Mr. Walters, is in the city and will be here for three or four months. He will put all the company's wires in the fire limits underground.

OKLAHOMA, O. T.—J. W. Wilson, local manager of the Missouri & Kansas Telephone Company, has filed with the city engineer a blue print of the system of underground conduits which the company is planning to lay in this city.

ELECTIONS

WASHINGTON, D. C.—At a meeting of the board of directors of the International Telephone Company of America held here, Messrs. Bayard, Poe and Hammond, attorneys, at 404 Fidelity Building, Baltimore, Md., were elected general counsel of the corporation to succeed Messrs. Norris and Fay, of New York, resigned. This is the company which was incorporated several years ago for the purpose of installing telephones in all houses charging only two cents for each call. So far as can be learned, the company has never been able to secure franchises in a single town.

ATKINSON, ILL.—The annual meeting of the Henry County Telephone Company was held here recently and the following officers elected: Thos. Powers, president; Daniel Porter, vice-president; Geo. W. Murphy, secretary; John F. Nowers, treasurer; J. C. Dewey, of Anowan; Elijah Storey, of Kewanee, and James Douglas, of Anowanee, directors.

GREAT BEND, KAN.—The Grimes Brothers Telephone Company, of this city, has sold out its system in Great Bend to the Rock Telephone

THE WEEK'S MESSAGES—Concluded.

Company, of Larned and Pawnee Rock, Kansas. The purchase includes all toll lines, station instruments and central exchanges. The managers of the Rock Telephone Company are up-to-date men and will operate a first-class telephone system in this city.

UNIONTOWN, KY.—V. L. Givens, J. R. Jenkins and Dr. H. E. Whitledge have purchased a local telephone system from Claiborne P. Cassell.

HEATH, MASS.—The Heath Telephone Company has elected the following officers: W. D. Kinsman, of Heath, president and general manager; Honorable Herbert Newell, treasurer, and George Davis, secretary and clerk.

KIDDER, MO.—The Home Telephone Company, of Kidder, has elected the following directors: E. S. Hill, J. W. McCree, Eli Penny, James Brookshier, G. C. Conrad, James Burket, John Whitelaw, Jr., C. A. Metz and J. H. Burnett.

PAPILIOUS, NEB.—The Home Telephone Company held a meeting recently and declared a 10 per cent. dividend. The following officers were elected: J. D. Clark, president; W. S. Rakes, vice-president; A. W. Clark, treasurer, and C. F. Calhoun, secretary. The company has orders for fifty additional telephones.

CAMBRIDGE, N. Y.—The annual meeaing of the Buskirks and South Cambridge Telephone Company was held here recently, at which the following officers were elected: Edgar B. Chase, S. S. Sisson, Edwin T. Cornell, Ira S. Durfee, Zina L. Burch, Fred M. Dewey, Charles King, G. Webster Pratt and Edward Whiteside.

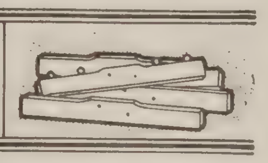
EDON, O.—The Edon plant of the Williams County Toll Company has been sold to a new company to be known as the Edon Home Telephone Company.

WESTERLY, R. I.—At a meeting of the stockholders of the Westerly Automatic Telephone Company the following officers were elected: Dr. John Champlin, president; A. B. Crafts, vice-president; J. Irving Maxson, secretary; Charles E. Sherman, treasurer. The old directors were re-elected.

CHARLESTON, S. C.—At a meeting of the board of directors of the Gordon Telephone Company, Gerald M. Fennell resigned as president, and P. R. Rivers was elected president in his place. A majority of the new directors are residents of Charleston. This is in consequence of a change in the ownership of stock, the majority now being in Charleston.

LA CROSSE, WIS.—The La Crosse Telephone Company has elected the following directors: F. P. Hixon, G. H. Gordon and Henry Gund.

New Construction in the Field



LESLIE, ARK.—Dr. Reich, owner of the Reich Telephone Company, is arranging to install a switchboard here.

JULESBURG, COL.—B. A. Lathrop has just constructed a telephone line connecting Julesburg with Chappell, Lodge Pole and Sidney. It is probable he will put in an exchange here and extend lines to Sedgwick and Big Spring.

PITKIN, COL.—The Pitkin Telephone Company will construct a line between this place and Dennison, and has let the contract to McCormick and Wagner. The contract was also let for the extension of a line from Bowerman to Waunita.

HARRISON, IDAHO.—The Interstate Telephone Company, which is extending its lines to Spokane, Wash.; Coeur d'Alene, Rathdrum and Sand-Point, will put in an exchange here.

CANTON, ILL.—At a recent meeting of the stockholders of the Canton Home Telephone Company, it was decided to extend the system.

CHANDLERVILLE, ILL.—B. R. Stuton, Will Dillow, Daniel McNiel and others are arrangeing to construct a telephone line from this place to Oakford.

ERNST, ILL.—H. Deitzel, Mike Geheb and William Hammerly are constructing a telephone line through this town.

LEXINGTON, ILL.—L. Hynerman is constructing a telephone system here.

PATRIOT, IND.—The Farmers Telephone Company, of Goose Creek, met with other companies operating in this vicinity recently, and decided to construct a local exchange.

BELLEVILLE, KAN.—The Belleville Telephone Company has completed a toll line to Clyde, and expects to commence work on the line to Fairbury in the near future.

HADDAN, KAN.—A. M. Ochiltree, of Haddan, has purchased the toll line running from Cliffton, Mahaska and Washington, and will construct an exchange here.

DETROIT, MICH.—The Co-operative Telephone Company will construct a line from here to Pontiac to connect with the Pontiac Independent Telephone Company.

CROOKSTON, MINN.—The Iron Range Telephone Company will install a central energy telephone system in this city next spring, and is taking out the present long distance telephones and replacing them with the old style instruments. The telephones which are being taken out will be shipped to other exchanges owned by the company.

LA GRANGE, MO.—John Harrison, Alfred Smith, Clarence Smith, Robert Ewing and William Weber are the stockholders in the company that will construct a telephone line from this place to Weber, Mo.

MOUND CITY, MO.—The Mound City Telephone Company is arranging to build an exchange at Rulo.

TAMORA. NEB.—The Tamora Telephone Company has completed construction in town and will commence building in the country at once. The company expects to build several rural lines before the end of the year.

YORK, NEB.—The York Telephone Company has completed the west line to Hampton and expects to extend all lines before spring.

ATLANTIC CITY, N. J.—The Atlantic Coast Telephone Company has leased a building and will install a new exchange.

WASHINGTON, N. J.—The line connecting the Washington Rural Telephone Company with other points in Warren County is being rebuilt by the West Jersey Toll Telephone Company.

HUDSON, N. Y.—The Columbia Telephone Company, of Hudson, is making arrangements to extend its lines to Velatin.

NEW YORK, N. Y.—The Standard Protective Company is a concern that was recently incorporated under the laws of the state of Maine, with a capital stock of $500,000 for the purpose of constructing and operating the Schwarzschild Telephone Burglar Alarm system.

PLATTSBURG, N. Y.—The Clinton Telephone Company is arranging for the purchase of a building to serve as an exchange, and will soon start work on its system in this city.

WOLCOTT, N. Y.—E. T. Phillips is constructing a telephone exchange in this town, and will build lines to North Wolcott and South Butler.

BATESVILLE, O.—The Batesville Telephone Company has let a contract for the construction of a new building, in which it will install its exchange.

KIDRON, O.—The Kidron Telephone Company will complete the twenty miles of lines which it started some months ago. The officers are Jacob P. Somer, president; Valentine M. Gerber, secretary, and Elias P. Gerber, treasurer.

WEST MANCHESTER, O.—The West Manchester Telephone Company has been reorganized, and will improve and enlarge its system. It will extend local and rural lines, and increrase its switchboard capacity.

WESTMINSTER, O.—The United Farmers Telephone Company held a meeting here recently and considered the question of purchasing property on which to build a central office. The company is at present constructing its lines.

SHICKSHINNY, PA.—Superintendent Pryor, of the Peoples' Telephone Company, is here arranging to extend the line into Shickshinny.

YORK, PA.—The York Telephone Company is extending its lines in all directions. A new line to be constructed will run from Conrad's Cross-Roads to Shenk's Ferry and Dellinger's Mill.

MALTERBORO, S. C.—Harry W. Jones, of Makin, Ga., is here with a view of establishing a local telephone system.

WALHALLA, S. C.—George L. Wilson, manager of the Oconee Telephone Company, of this place, has been granted a franchise for the construction and operation of a telephone system in the town of Franklin, N. C., and will start construction at an early date. He has fifty telephones in sight, and will construct an all-metallic system.

GREENVILLE, TENN.—The Independent Telephone Company has received its switchboard and is working on the construction of its city lines. The company will open up connection with Knoxdale and Bristol and many other towns.

SOUTH ROYAL, VT.—The People's Telephone line is to be extended to Royalton.

SEATTLE, WASH.—Advices from Dawson state that N. A. Fuller, president of the Yukon telephone syndicate, operating in Dawson and vicinity, and four others, have formed a company to be known as the Fairbanks Telephone Company, with a capital stock of $50,000, for the construction of a telephone system in Fairbanks.

GREENVILLE, W. VA.—T. A. McNeer, general manager of the Greenville Telephone Company, held a consultation with representatives from Union and other towns, to decide whether to extend the lines of the company through the upper part of the county into Greenbrier and Allegheny counties.

TRADE NOTES

The Standard Underground Cable Company announces that its San Francisco offices have been moved this month from the Mills building to larger quarters in the Crossley building, at the corner of New Montgomery and Mission streets.

The American Telephone Company, Chicago, Ill., is placing on the market a new lightning arrester and distributing board for small exchange work. The principle involved is a pencil fuse, having a shell of carbon and a heavy carbon ground plate, the pencil carbon and the fuse being in series with each other, which gives 3 inches of carbon surface besides a 3-inch fuse on every line. All will be mounted on an iron frame and adapted for quick and positive cleaning or repairs. The same principle is applied to individual toll line or telephone protection.

The Automatic Electric Company, of Chicago, Ill., has sent us a copy of its new catalogue. The automatic system is described and the points of difference between it and the manual systems are noted. The different types of apparatus and the various components are given description and illustrated with half-tones. Photographs are shown of the equipment at the recently installed Dayton, Ohio, exchange. The back of the book is taken up with pictures of the different departments of the company's manufactory at Chicago. The catalogue is well and neatly gotten up throughout.

The Franklin Rolling Mill and Foundry Company, of Franklin, Pa., is constantly receiving orders for test poles of its manufacture, while in other instances they are receiving orders in wholesale quantities, which are being filled by the Danville works. Only recently the company received an order for 100 poles to be shipped to Manila, P. I., and if the test proves satisfactory, which it doubtless will, thousands will be sent to South America, Mexico, Africa, and all other foreign countries.

The tripartite steel pole erected by the Citizens' Traction Company at the corner of 12th and Liberty streets, Franklin, Pa., is causing quite a bit of comment among those interested in overhead construction. This pole bears a great strain and has taken the place of a large wooden pole that was snapped off like a reed by the heavy weight placed upon it.

The American School of Correspondence, at Armour Institute, Chicago, Ill., does some long distance teaching. When Prof. John E. Snow at Chicago sits down at his desk and dictates to a stenographer the solution of a difficult material tangle in mechanical engineering, directing it to T. B. Matthews at La Bosa, Fiji Islands, 13,000 miles away, it will be six weeks before Mr. Matthews receives the envelope, and it will be another six weeks before the professor possibly can hope to hear in answer. But in the meantime it is suggested that Prof. Snow is in closer touch with Mr. Matthews than are most professors in resident schools who speak to their pupils face to face. For Mr. Matthews is Prof. Snow's pupil in mechanical engineering, and the dictation is simply one of the every day points of Instruction which radiate from the American School of Correspondence connected with the Armour Institute of Technology.

The National Wire Corporation, of New Haven, Conn., is one of the new comers in the galvanized wire business, but it has been singularly successful in meeting the requirements of the large telephone companies of the country, and its wire is already recognized as one of the few absolutely reliable grades on the market. This company is building another wire mill, which will double its capacity, and wire mill No. 2, as it is known, will begin operations in all probability within the next two weeks. Still further additions to their already large plant are under way and are being pushed as rapidly as possible. This company is the largest constituent company of the National Steel & Wire Co., which also owns and operates mills in DeKalb, Ill., and Oakland, Cal., and they are one of the largest independent companies in the country. The galvanizing department at New Haven is running night and day on high grade telephone and telegraph wire, and there is no prospect of any slackening in the demand for this class of material. It is also very busy in its wire rope department, where it is making a specialty of high grade galvanized strand.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—A telephone system with 200 miles of line in operation, 325 subscribers, and 200 miles extension needed immediately. Located in a boom town in Northwest Arkansas, WITHOUT COMPETITION, and from which excellent connections may be had with Indian Territory, Joplin, Springfield, and other Missouri points, also Little Rock, Ark. This system is the key to the situation. It pays 15 per cent. annually, with best of prospects of paying 25 per cent. inside of a year. Three new railroads are building; also electric line and two other roads under survey. Good reason for selling. Address, HERMAN H. VER MEHREN, 633 Paxton Block, Omaha, Neb. 96.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

POSITION.—A first-class construction man with thirteen (13) years' experience in telephone (both Independent and Bell) and electric light work, desires connection with a telephone company in its construction department. Will be at liberty Nov. 30. Address, Box 99, The American Telephone Journal, 116 Nassau St., New York City. 99.

POSITION.—Wanted position as Superintendent or Manager of telephone company. Have had 9 years' experience in building telephone exchanges, operating and maintaining. Have just finished 200 miles of toll line and 5 exchanges. Am Superintendent of Construction for Bell Telephone Company at present; 30 years of age, and strictly temperate. Can furnish best of references. Address, P. O. Box 52, Malden, Mo. 94.

WANTED.—A few young telephone men of good character and with best references to do extra work. Liberal compensation offered to the right men. Address, Box 103, care The American Telephone Journal, 116 Nassau Street, New York City. 103.

POSITION. Switchboard man, five years with Bell, forty-two hundred board, understands motors, power plants, storage batteries and gas engines, desires position with progressive Independent company. A 1 references. Address, Box 101, The American Telephone Journal, 116 Nassau Street, New York City. 101

POSITION.—Position wanted by a practical expert with a company about to build or desiring to enlarge its exchange. Have machinery for manufacturing telephone appliances. Address, Box 95, The American Telephone Journal, 116 Nassau Street, New York City. 95.

MANAGER—A good, live, energetic, capable man of experience wanted to manage a large Independent telephone system in the West. Must be able to invest not less than $10,000 in the company. Address Box 102, The American Telephone Journal, No. 116 Nassau street, New York City. 102

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau St., New York City. 73.

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VOLUME VIII SATURDAY, NOVEMBER 7, 1903 NUMBER 19

A SUB-AQUEOUS TELEPHONE

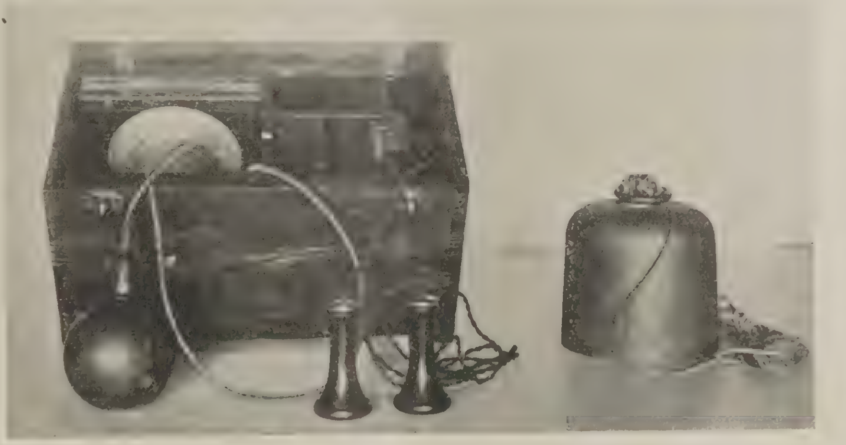
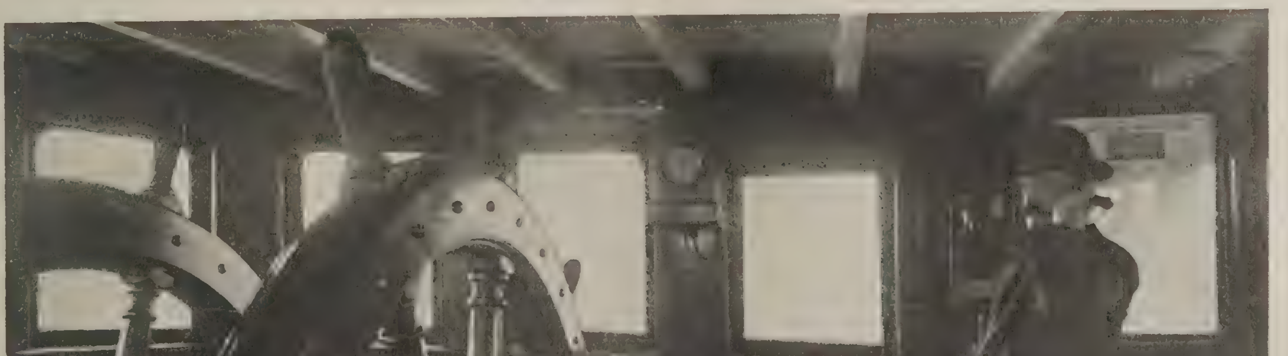


Fig. 1. Ball Receiver for Detecting Submarine Sounds and Associated Apparatus Arranged for a Schooner. On the Right is a Submarine Bell.

TRULY, telephonic wonders will never cease. We talk across the Continent, and we are talking, at least in the laboratory without wires, and now the most recent development of the telephone is a contrivance with which ships can be equipped in order that they may, by sound, be able to navigate when, owing to fog and other causes, ordinary signals are obscured. The essence of the invention consists in placing a very delicate transmitter or microphone in the inside of a waterproof cup which is secured to the hull of the vessel at a considerable distance below the water line. Now suppose a vessel to be equipped with a number of such transmitters, one of which we will say is located at the bow on one side of the ship, the second on the midship, and the third at the stern, and that the other side of the vessel be similarly equipped. It is well known that sound waves can be transmitted through water with as great facility as through the air, and with a considerably greater speed on account of the greater density of the transmitting fluid. So if any sound waves pass through the water they will impinge upon the transmitter and can be heard in any receiver which is connected thereto. The principle of the invention, however, really lies in the multiplicity of transmitters which are located along the hull of the vessel, and the arranging of these transmitters so that they may be successively cut into circuit with the receivers. The arrangement of the circuit is shown in Fig. 3, in which two transmitters are associated with a pair of receivers which may, by means of a switch shown in the illustration, be instantly changed from one transmitter to the other. The receiving apparatus is preferably located in the wheel house, as is shown in Fig. 3. If the vessel is approaching a coast where a lighthouse

Fig. 2. The Pilot House of a Boat Equipped With Telephonic Submarine Signalling Apparatus.



is equipped with a fog bell or siren, the sound waves produced by these will again be reproduced by similar waves in the water. These sub-aqueous sound waves will act upon and affect the diaphragms of the transmitters or microphones which will produce a current of varying intensity, which will in turn cause the receiver in the circuit to make a sound. The pilot switches his receiver successively from one transmitter to the other from bow to stern, along both sides of the vessel, and it is easy to understand that the sound produced in the receiver will be greater when it is connected to the transmitter that is nearest to the direction in which the sound is coming, and it is easy for the pilot to tell whether he is approaching a sound or receding from it, or whether it is on the port of stern side of the vessel. The vibrations can be initiated by a bell that is hung over from the side of the lightship or suspended in the water, at the end of a cable, from a lighthouse, or from a bell buoy operated by the waves. The bells can be struck with a hammer exactly like a bell in the air, only with considerably more force. These vibrations are taken up by the receiver on board the vessel and transmitted electrically exactly the same as through the telephone. The ear pieces are identical with those used in the telephone. The invention does not require the captain of the vessel to use delicate telephone apparatus and tables of logarithms, but simply to use two telephone ear pieces with which to listen to the bell. In other words, the faculties that are cultivated in him are the very ones that he most uses. Fig. 3 shows the iron starboard and port receiver cases, with their wire connections to the receiving boxes in the wheelhouse. Fig. 1 shows a type which has been invented for fishing boats or for small vessels of any kind, and a receiving box, with a ball receiver, which is lowered into the water. It is obvious that some sounds would be too delicate to penetrate the skin of a vessel, and therefore might not be heard by the receivers located on the inside. To meet this case a receiver has been invented which is lowered directly into the water and which picks up sounds of comparatively small intensity. In case of emergency, for example, where a vessel is not supplied with receivers located on her own hull, by lowering one of these ball receivers first on one side of the vessel then on the other and noting the difference in the intensity of the sound, it is perfectly practical to locate the source of the signal, whether it be the signal of a fisherman in a dory, or a bell buoy, or any other vessel. A great variety of uses of this system immediately present themselves, as, for example, the possibility of being able to detect the approach of a submarine boat. The receiving apparatus is so delicate that it picks up sounds of small intensity.

If it is possible to telephonically ascertain the fact that a submarine boat is approaching a cruiser, and from what direction, half the terrors of this weapon of warfare disappear. It would be possible, also, for naval vessels under fire to signal to each other through the water, using such a code as may be determined upon. At the present moment air signals between vessels of a squadron may be obscured by darkness or fog, rain, snow or the smoke of their own stacks. . Such an invention appears to have many possibilities. At least it is easy to conceive its application to the guidance of vessels under almost any circumstances, and that it may in the future prove of value in averting some of the appalling marine catastrophies that even with the modern appliances of to-day, too frequently take place.

DEPRECIATION[*]

By Henry V. Bastin.

DEPRECIATION, and what is it? Depreciation is the lessening in value of a particular thing due to some change in its condition or a change in its relation to other things. As applied ordinarily to telephony it refers to the lessening in value of a plant due to the decay of poles, wires, switchboards, ets. Some would have you to believe that there is a depreciation in the plant due to the rapid advancement in the science of telephony. While this was undoubtedly true a few years ago, now I believe that the time has come in which apparatus is so well perfected that no one need fear the necessity of having to throw it into the scrap-heap before it has served out its natural life. The object of this paper is to investigate the lasting qualities of the various materials and apparatus used in the construction of a modern telephone plant, and to determine the annual rate of depreciation of the parts and the whole due to the ravages of tear and time; and to mention the importance of giving it due consideration in the financing of a plant.

The argument is advanced by some that by proper maintainance of a plant, it can be kept in as good condition as when built. This, I think, is entirely unwarranted; a telephone plant, like all other human productions, will wear out. It is practically conceded by the best telephone engineers that the only business way to provide for this wearing away is to lay by each year a certain per cent. of the original cost of the plant to be used for rebuilding when found necessary. This depreciation fund may be placed in a bank, loaned out at interest or reinvested in the telephone business, if thereby it will pay more than the current rate of interest. If this later method be followed, it will be necessary to borrow money for rebuilding the original plant. But this will be all right, for, during the time of operation, the plant should more than double in size—increased by compound interest, so to speak—with only the original part of the plant to be rebuilt. So long as it is strictly borne in mind that there is a depreciation, and provision made to meet it, all will be well. But if that which should be reserved for depreciation be paid out in dividends while the plant is new, an unwarranted premium will be placed on the stock at this time, and an injustice and hardship on the stockholder when the time comes for rebuilding.

Happily though for the Independent movement, the greater number of the companies do, in one way or another, provide for depreciation, and they do it most abundantly. The percentage usually considered to be right varies between 8 and 12 per cent. A most pleasing extreme from the company that lays by nothing. Aside from the necessity of providing for rebuilding, there is another reason why depreciation should be studied—it enables the engineer to build or maintain the plant from the most economical materials (service, original cost, maintenance and length of life being considered.) He must not use cheap materials, labor or apparatus because they are cheap; neither is he justified in buying that which costs most, with the idea of it lasting longest, and giving the best service. But to do justice to the company, himself, and his profession, he should investigate, keep records and thoroughly familiarize himself with these things. I would like to say here that the figures which I use have been decided upon after a deal of correspondence and investigation, and are not original by any means, representing the opinion as near as I can ascertain, of men who are best informed on the subject.

A plant is divided into two general heads:

I. Office and subscriber equipment.

II. Outside construction.

I. The first division is divided into three classes. (*a*) Local battery. (*b*) Central battery. (*c*) Automatic.

Of these I shall discuss only the local battery and central battery. The automatic has not been in operation long enough for us to say anything regarding its lasting qualities.

(*a*.) Local battery systems were entirely used by both Bell and Independent companies up to about 1897. Local battery boards frequently giving continual service in the Bell exchanges for 10 and 12 years; telephones being used even longer than this. When it is remembered that these old boards and telephones were very inferior in design and construction, and were not kept repaired in the best manner, are we not justified in saying that modern local battery switchboards and telephones, built by reliable firms, should last 20 years, if maintainance be propely looked after? This gives 5 per cent. depreciation.

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[*] Paper read before the Kentucky Independent Telephone Association by Henry V. Bastin, Lancaster, Ky. Mr. Bastin graduated from the Telephone Department of Purdue University last June, and is now general manager of the telephone company at Lancaster, Ky.

(*b.*) In central battery systems there is a finer, neater mechanical arrangement that is accompanied by much less wear and tear than in the local battery, and consequently a longer life may be expected. It is thought that 25 years of service may be mad of a first-class central battery equipment. Thus 4 per cent. depreciation.

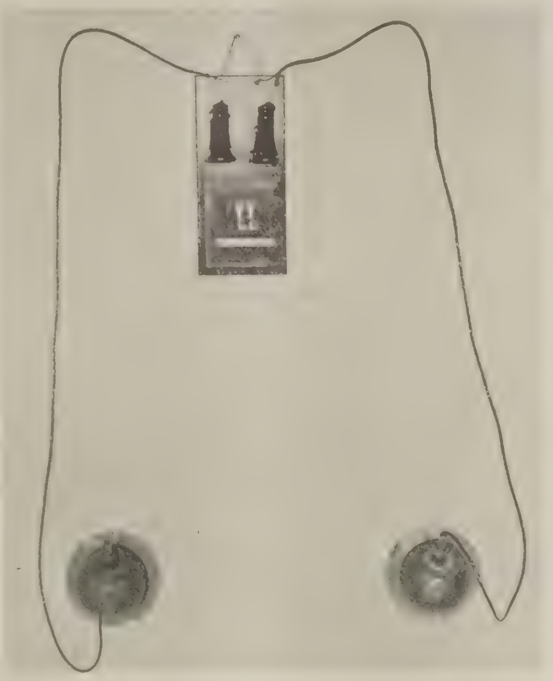


Fig. 3. Two Receiver Cases With Connections to the Receiving Box.

II. Outside construction is divided into two classes: (*a*) Underground. (*b*) Aerial.

(*a.*) In underground construction and especially conduits, we have the most permanent part of the plant. Conduits built of vitrified clay or terra cotta and concrete, being removed from sun and rain, freezes and thaws, are almost as everlasting as the Pyramids themselves. A rate of 2 per cent. is charged off to underground conduits, though I see no reason why 1 per cent. would not suffice.

Underground cables: The great enemy of undeground cables in the past has been electrolysis But high.insulation conduits and greater care in installation have about eliminated these difficulties. In the past cables were frequently destroyed, wholly or in part, by high potential currents and lightning discharges. However, by the use of improved protectors these have ceased to be factors. We have practically nothing to go by in determining the life of a well protected cable except guess-work. In view of the fact that an old cable is worth considerable as junk when discarded, a rate of 2 per cent. has been decided upon.

(*b.*) Aerial construction:

Poles: Cedar and chestnut poles are almost entirely used in this country. Cedar poles 24″ to 30″ circumferential butt measure, last about 15 years. Poles 30″ and upward last about 20 years. Corresponding size chestnut poles will last 10 and 15 years respectively. As the tendency is toward using poles of the larger size, these only will be considered. Thus 5 per cent. for cedar and 6, 2/3 per cent. for chestnut.

Creosoted poles: Creosoted pine poles erected 30 years ago in England, are still in good condition and will, apparently, last some time yet. I am informed by a gentleman who began creosoting paving blocks 32 years ago, that the first blocks treated are still sound and good, apparently good for 32 years longer. He is of the opinion that creosoted timber can be depended upon for at least 35 years. A depreciation on poles and cross arms of 3 per cent.

Crossarms of first-class long-leaf pine will last only about 12 years, 8 1/3 per cent. depreciation. If arms are painted every two or three years, they can be made to last as long as the best cedar poles. 5 per cent. depreciation.

To obtain the above figures, it is necessary that arms and poles be not unduly strained. A factor of safety of 10 per cent. being about right.

Pole hardware: Bolts, braces, screws, steps, strand, etc., will last as long as the poles on which they are placed, if well galvanized. According to modern practice it is undesirable to use plain hardware of any kind, the galvanized being much superior.

Aerial cable: If aerial cable is well put up, not run through trees, and well protected from lightning and high potential currents, it will last about 20 or 25 years, 4 per cent. being ample for depreciation.

Copper wire: There is practically no depreciation in copper wire due to the elements. Cutting and splicing will eventually render it useless. Copper wire, as junk, will about half replace itself. 2 per cent. is charged for depreciation.

Iron wire: The life of iron wire varies considerably in different localities, 3 to 5 years being a fair average in smoky districts; while through the open country it will last as long as 13 to 15 years. Under favorable conditions, 7 per cent. is about right.

General summary:

I. A modern exchange with central battery equipment and a large percentage of underground construction, creosoted poles and crossarms, copper wire leads and first-class maintenance, should show no more than 2½ to 3 per cent. depreciation.

II. Toll lines of creosoted poles and arms, copper wire leads, and well guyed, will have a depreciation of about 3 per cent.

III. Medium and small exchanges, with untreated poles and arms and galvanized iron wire, cable where necessary, from 5 to 7 per cent.

IV. First-class country lines untreated poles and arms, galvanized iron wire from 6 to 8 per cent.

In conclusion, gentlemen, let me say this: Build your plants well. Build them in that logical way, like the deacon built "that wonderful one hoss shay," and your maintainance bills will be small. Impress on your maintainance department that a stitch in time saves nine, then your depreciation will be at a minimum.

NOW THE TELEPHONE IS IN POLITICS.

POLITICIANS in Cleveland, Ohio, adopted a novel method of advertising their party. The Republican committee hired a suite of rooms and installed in it the necessary apparatus for calling subscribers. Then thirty-two sweet and gentle-voiced operators were engaged and instructed to call each voter in the city and request them to be sure and register, so that they could vote on November 3. No preference was shown and voters of all parties were called up and given the warning. The operators started in at A in the directory and called all right straight through, so that few eligibles escaped. It is said that Senator Hanna and Colonel Herrick were back of the scheme.

THEY DISPATCH AUTOS IN JERSEY.

TOLL-GATES in New Jersey are connected by telephone, and when an automobile without a Jersey tag passes one gate the keeper promptly telephones ahead to the next, the motorist on reaching it, finding it closed and locked. Meantime the keeper has notified the nearest officer, who is on hand to arrest the culprit and take him before a migistrate.

SOMETHING ABOUT MICA.

MICA is an excellent insulator, and for this reason is largely employed in building up commutators, etc. Chemically, it is a compound silicate of aluminum and calcium, and is found in the mineral state.

A NEW FIELD FOR INTERIOR SYSTEMS

By C. H. Coar.

UPON entering a modern apartment house, one is usually confronted by a row of push buttons which ring bells in the different apartments. Speaking tubes in connection with these form the means of holding conversation with the tenants. These speaking tubes usually communicate with several apartments, which so lowers their efficiency that anyone who has used them cannot fail to realize that a telephone would be a vast improvement.

In Fig. 1 an interior system is shown, which is proposed for the purpose mentioned, and still, in addition, it will give each of the tenants means of communicating among themselves or to the attendants of the building. This system is supplied by a common battery *B*, which furnishes current for both ringing and talking. It is evident from tracing the circuits that any station can be rung, regardless of the position of its plug. This system has one bad feature. If any two stations are connected, and a third station calls, the first two will be signaled. Cross talk is possible in this system, because the transmitters are all supplied from one battery, and might be caused by the variations in potential of the wires *B* and *C*. When one transmitter is in action, it causes a variable current to flow over *B* and *C*, and consequently causes a variable potential at all of the telephone taps. In case more than two telephones are used these variations of potential may distribute themselves over the circuits of the other telephones causing cross talk.

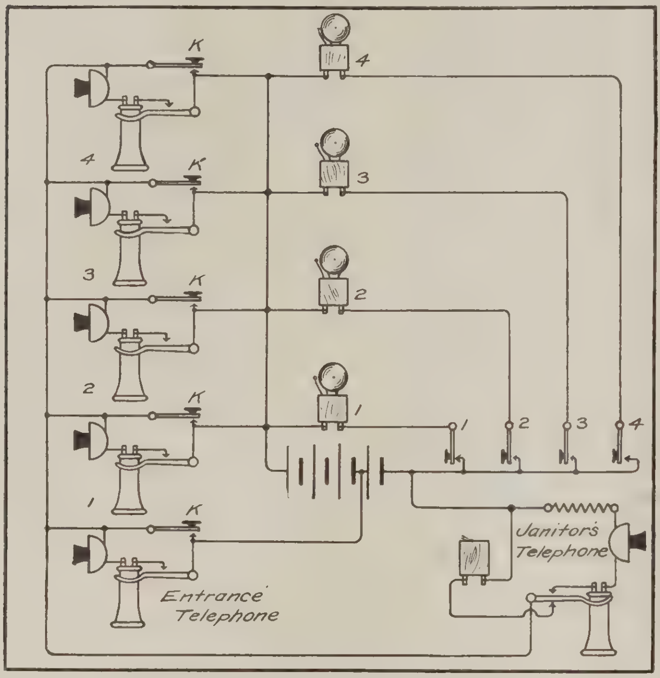


Fig. 2.

To obviate cross talk an impedance coil *E* is placed in series with each transmitter in order to make these transmitter circuits higher in resistance than the circuit formed by the battery *B* and *C*. With this impedance coil in the circuit the variations in the line voltage are a smaller per cent. of the total voltage and therefore the greater impedance of these coils the less the cross talk. While these impedance coils cut down the efficiency of transmission, the prevention of cross talk more than compensates. Making the wires *A* and *B* of very low resistance will also tend to cut down the cross talk. The battery *B* should be placed as near as possible to the center of the system so that its current may be distributed to the best advantage.

The best of material, of all kinds, should be used in such installations; such a system will receive the hardest kind of usage. It would be well to have each wire of a distinct color, in order that they may be readily picked out in case of trouble.

In Fig. 2 is shown a system which can be installed in places where push buttons have previously been used. The original bell circuits can be traced each from its button through the bell to the common return *C*. By the addition of the wire *L* throughout the system, telephones may be placed in the apartments by using this wire and the common bell return for the lines. The wire *L* could be dispensed with by using a ground instead. The telephones *1*, *2*, *3* and *4* are of the simplest design, being merely a transmitter and receiver in series with a hook contact. It will be seen that they are fed from the ringing battery *B*. The push button *K*, located at each telephone, is to enable the tenants to call up the janitor's telephone, which has a bell in its circuit. One side of the entrance telephone is tapped from the battery direct, in order that it may receive a flow of battery while talking to the janitor or tenants. The position of this tap is determined by the relative position of the entrance telephone to the others. In most cases the janitor's telephone would be nearer than the tenant's, hence would require less battery to operate it, as shown in the diagram.

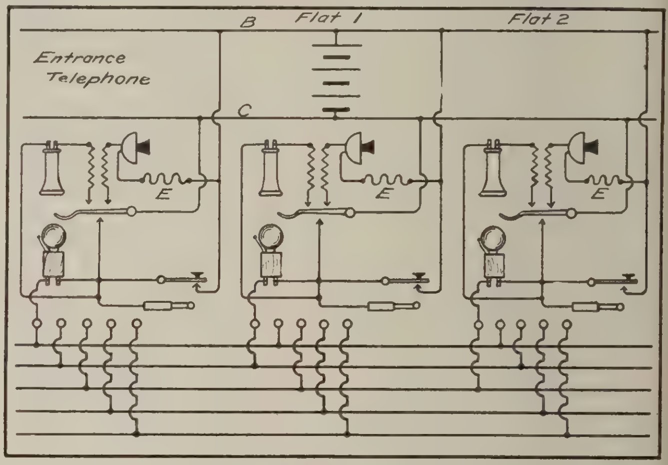


Fig. 1.

IN A PLACE TOO HOT FOR TELEPHONES.

TELEPHONE mistakes may have their serious sides. A man who wanted to communicate with another named Jones, looked in the directory and then called up a number. Presently came through the receiver a soft feminine "Hello!" and he asked, "Who is that?"

"This is Mrs. Jones."

"Have you any idea where your husband is?"

He couldn't understand why she "rang off" so sharply until he looked again and discovered that he had called up the residence of a widow.—*The New Yorker.*

CHEAP RATES IN AFRICA.

IN Central Africa the telegraph system of Uganda now extends to Batiaba, on the shore of the Albert Nyanza. The trunk line from Mombasa, with its branches is more than 1,034 miles in length, and the charge over the whole distance is 4 cents a word with a minimum of 1 shilling and 4 pence (32 cents) for a message of eight words. There is also a system of telephones along the whole distance which may be used at 32 cents per conversation. The poles on which the wires are fixed are living trees.

ALASKA'S TELEGRAPH SYSTEM.

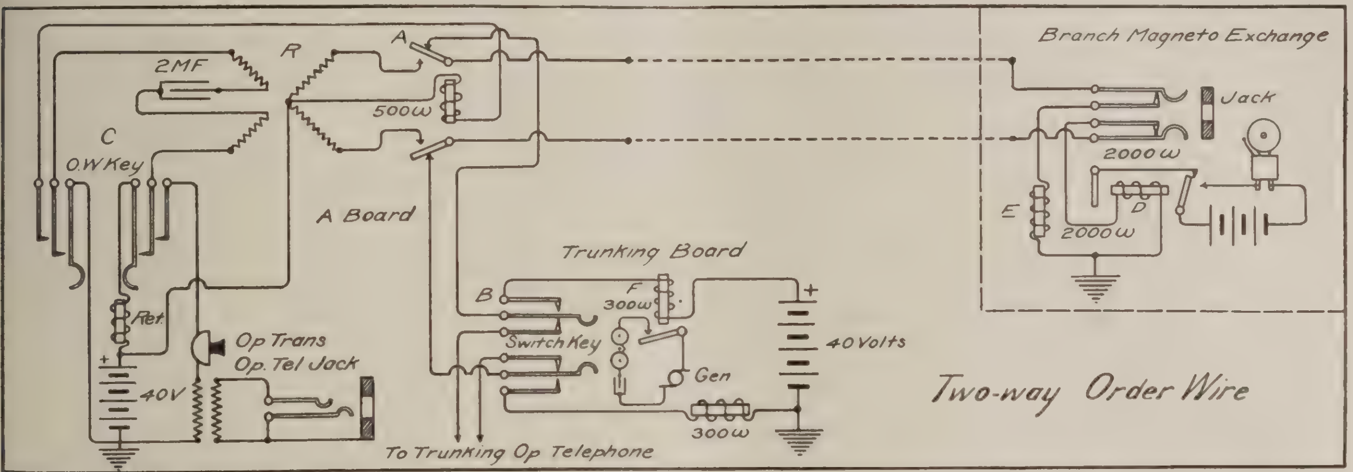
SEATTLE, Wash., can now reach St. Michaels by the telegraph, the line having recently been completed. Messages are forwarded to Nome by mail. This marks the completion of the American government's great Alaskan land system.

A TWO-WAY ORDER WIRE CIRCUIT

By Wm. Geckler.

On a telephone system having a main exchange and branch exchanges a trunking system must be employed, usually requiring order wires. This generally necessitates outgoing and incoming pairs. Where the branches are some distance from the main exchange or where cable or cross-arm capacity is at a premium, a circuit by which one pair of wires can be used both as an incoming and outgoing order wire becomes desirable.

Such a circuit, designed by the writer, to meet this sort of a demand, is herewith described. In this case the main exchange was of the common battery type and the branch exchanges were of the magneto types. It will be noticed by referring to the drawing that at the magneto exchange only a slight alteration was required in a subscriber's line equipment to make it serviceable for terminating the order wire circuit. The necessity of equipping the branch exchanges with order wire keys was thus avoided. The regular drop was exchanged to one having a resistance of about 2,000 ohms and in series with it an impedance coil of like resistance was cut. An earth connection between the drop and impedance coil was made as indicated in the drawing.



Normally the circuit stands closed from the branch exchange jack over line wire through contacts on relay *A* and inner contacts on shifting key *B* to the trunking operator's telephone. The A operator at the main exchange upon closing the order wire key *C* causes her telephone set to be connected in multiple with the primary winding of the repeating coil *R* and at the same time closes the battery circuit through the winding of relay *A*. This closes the circuit from the positive side of the battery through the contacts, on relay *A* over both wires to the branch exchange through drop *D* and impedance coil *E* in multiple to earth which causes the shutter at the branch exchange to be released. This informs the operator of a call. It is answered in the regular manner by inserting the plug of an answering cord into the jack.

The shifting key *B* on trunking board is employed to cut in a night alarm circuit. Upon the insertion of the plug of an answering cord into the jack at the branch exchange if key *B* is thrown to the outer contacts, the current from the positive side of the battery flows through the winding on relay *F*, contact on the key *B* over the wire and the contact on the relay *A*, over one side of order circuit to tip spring of jack, through operator's set at the branch exchange to the sleeve spring, returning over the other side of the order circuit through the contact on relay *A* over wire through the contact on key *B* through the impedance coil to the negative side of the battery. This causes relay *F* to close the night bell circuit. The trunking operator returns key *B* to normal position to answer the call.

Care must be exercised in connecting the battery for night alarm so that positive battery will be in connection with that side of order circuit having to earth the impedance at branch exchange. If connected the reverse the shutter on drop *D* at branch exchange will be released each time key *B* is set for night alarm

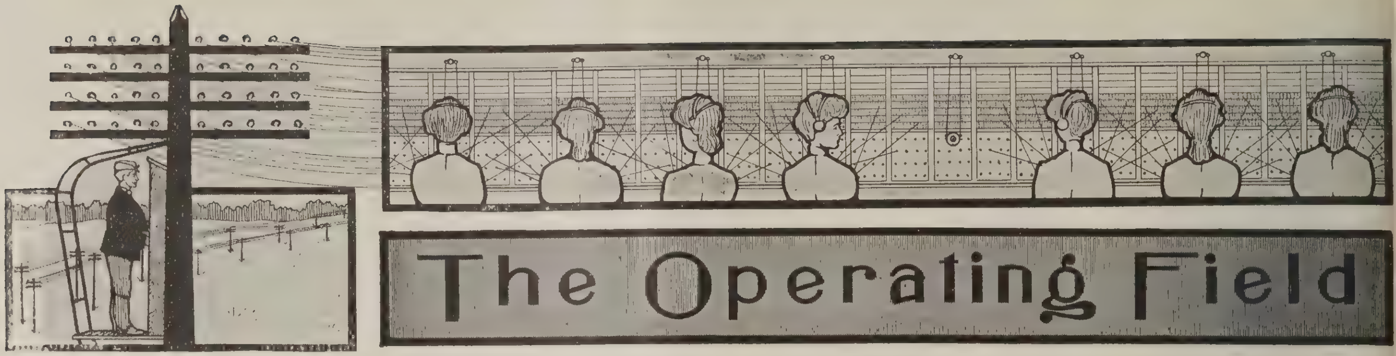
A TELEPHONE WAR IN CANADA

Out in Alberta, Canada, they have a telephone fight, in which the Bell Telephone Company and the Western Telephone Company, whose president is John T. Moore, late of Deer Park, are opposing factors. The Bell Telephone Company is now endeavoring to get people in Red Deer to take its telephones and sign contracts. Cautious and prudent citizens have declined to sign them. The Bell Company furnishes the old "magneto system." It makes one sign a three years' contract at $30 a year for a business telephone and $20 a year for a residence telephone, payable half yearly in advance. One really gives a note in one case for $90, and $60 in the other—"hard and fast." You can terminate the contract only every three years. If you don't give notice ten days before the first three years expires, it runs for six years, and so on. No service outside of Red Deer on the long-distance lines is given, except what is paid for.

The local organization (The Western Telephone Company) encountered unexpected delay from the action of the town-site trustees, relative to a power house site, and other causes, whereby the installation of electric light and telephone could not be accomplished this season. The town has not preserved the streets, as agreed, from the invasion of the Bell Company. Providing the town will carry out its agreement as to submitting a by-law this fall, and grant an extension of time for the completion of both the electric light and telephone plants until October 1, 1904, the Western Telephone Company authorizes the following statement of what it is prepared to do:

> Under a penalty of $1,000, to have the specified electric light and telephone systems installed and ready for operation by October 1, 1904. To furnish the most up-to-date, "central energy" system for $25 a year for business telephones and $10 a year for residence telephones, payable quarterly in advance, under yearly contracts, which can be terminated at the end of any six months.

The Western Telephone Company agrees to remove certain unreasonable restrictions imposed by the Bell Company, and the Western Telephone subscribers will enjoy all long distance privileges at the same prices.



The Operating Field

MICHIGAN TELEPHONE CO. SOLD.

WEDNESDAY last (Nov. 4), The Michigan Bell Telephone Company was purchased at the foreclosure sale held in Detroit by N. W. Harris, of Chicago, who represented a syndicate of bondholders of the company. The price paid was $4,100,000. The only other bidder was Gen. E. P. Meaney, of New York, who represented the American Telephone and Telegraph Company, who bid $4,000,000. The upset price for the property was $2,500,000.

COUNTRY NEWSPAPER TELEPHONY.

CONSIDERABLE amusement can usually be derived from reading a newspaper reporter's description of a telephone exchange and of telephone methods. Usually the smaller the newspaper the more humorous is the account. Following is the conception of a reporter on a small western paper. He, as usually is the case, begins by making a plea for the much abused operator. Evidently he was favorably impressed.

> People using telephones will sometimes feel angry at the operator because she has to tell them that "the line is busy, call again," but the girl can't help that. She would if she could, for she learns to be accommodating and learns that the fewer calls one has to make to get the party wanted, the less work there is for her.
>
> A peep into the operators' room sees *three rosy cheeked girls sitting on a stool* before which rises a board with little metal *droppers* all over it. The girls' heads are *harnessed* in black contrivances which look like *overgrown combs.* Some of the *sounds* that comes from the operators' room are, "Hello," "Number Please," "The line is busy now, call again, please," "What's that?" The boards in front of them are interesting contrivances and are wonderful pieces of mechanism. In front of each girl is a section of switchboard. Each section has two hundred different subscribers. The lower part of the section contains the *incoming ends* of the wires and the upper parts contains the *outgoing ends* of the wires. The connections are made by the operator by placing plugs in little holes—*but we won't attempt to tell all about the intricate contrivances.*
>
> When using the telephones remember that the operators have all they can attend to to look after their work and have no time to answer questions or listen to gossip. Treat the "Hello girls" kindly and they will do their best for you and the kinder you treat them, the better service will you get.

The italics are our own. We take it from the description that the three operators are sitting on the same stool. This is one method of keeping down operating expenses which as yet this paper has not investigated. The writer finally decides that he "won't attempt to tell about all the intricate contrivances." We feel that further description would be superfluous after such lucidity.

TELEPHONE BRINGS ANOTHER LOCOMOTIVE.

PASSENGERS and trainmen on the Rock Island "Rocky Mountain Limited" were indebted recently to a farmer's telephone for their arrival in Davenport, Iowa, although they were an hour and a half later than the schedule time. About two miles east of Ladora on the Rock Island the through train, which only stops in Davenport long enough to take water, was the victim of an accident, which would have compelled a long wait had it not been for modern science in the form of a rural telephone through the aid of which assistance was summoned and the train brought to the division terminal with little loss of time. A part of the engine known as the eccentric broke. The train men were desperate, but could do nothing to remedy the evil until Conductor Nicholas dropped from the rear platform and surveyed the situation. He arrived at the conclusion that the only thing to be done was to walk back to Ladora, where he could telegraph to Marengo for an extra engine and thus get to Rock Island, the terminal of the division. He was about to begin his trip back to the station when upon passing a farmer's home he saw a set of telephone wires running to it, and upon inquiring learned that he could gain the desired connection by the use of the rural telephone. At once making use of his lucky discovery he gave instructions to the agent at Ladora, who in turn wired to the master mechanic at Marengo, who immediately sent a new locomotive.

ARM, PIN AND BRACKET ASSOCIATION MEETING.

IT is announced that the meeting of the Association of National Arm, Pin and Bracket Manufacturers will be held in Chattanooga, Tenn., on November 10, 1903. An exceptionally good meeting is anticipated by the members of the association.

NO MORE TENDER WORDS FOR THEM.

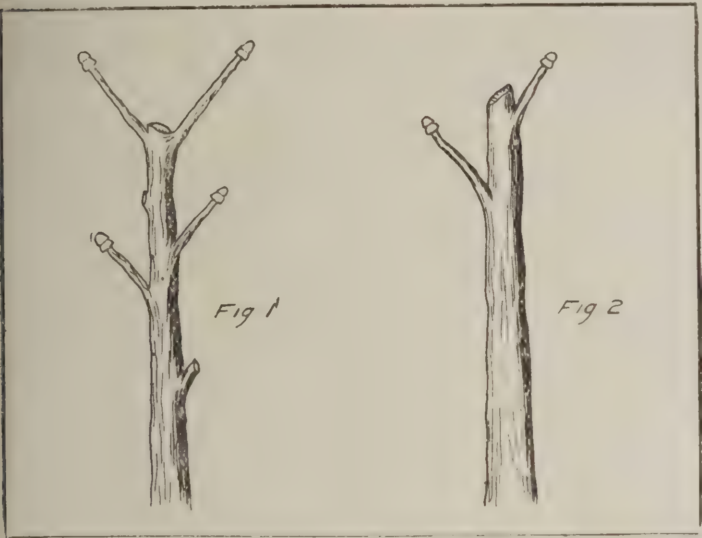
TELEPHONE operators at Logansport, Ind., are all of one mind. They think that the company is mistreating them. The recent order of the Indianapolis management of the New Long Distance Telephone Company is the cause for the trouble. It is bad enough, they say, to have to sit all day with a buzzing in one's ears and have a dozen drops more than one can handle, and have people wanting to be given places one cannot get for them, but the decree still stands. It is an order and will remain in force if it does break the hearts of the girls. The decree is relative to the use of "honey," "deary," "darling," and other names. The girls must not say these things, not even to each other. The managers who issued the decree say it is simply a matter of business, and that the conversation among employees should be in businesslike words. Those who have given the subject mature consideration have discovered a far more sinister motive in the cruel decree. If the telephone girls get in the habit of using terms of endearment in speaking to each other, it may encourage like conversation with other people not employees, and sweet appellations sometimes encourage lovemaking, and lovemaking sometimes gets to be serious, and then the company has to get new girls, and new girls are hard to get, sometimes.—*Logansport Journal.*

TOLL LINE COMPLETED IN WISCONSIN.

ASHLAND, Wis., people who are subscribers to the New Home Telephone Company may now talk from their offices or residences with people in Duluth and Superior. The new telephone toll line in connection with the New Home system has been completed to Duluth and Superior. This toll line also connects with local exchanges at Iron River, Brule and other points, so that the New Company's subscribers are now able with the line that runs to Washburn and also south to Mellen and other points to communicate with most of the towns in the region.

MOTHER NATURE'S BRACKETS.

THE drawings illustrate a method that is used in Texas and other places, for all we know, to do away with buying brackets on which to screw the glass insulators. Although the method is primitive, our correspondent claims that he finds it serves his purpose well. Oak poles are used which last only 5 or 6 years. The poles are cut in early summer. The figures show how branches are left on the poles just as they grew. Quite often it is possible to get trees that grow with branches as shown in Fig. 1. When this is the case, the saving in cost of brackets is considerable.



HINTS FROM GERMAN POLE LINE CONSTRUCTION.

UNSIGHTLINESS of American methods in constructing aerial lines is a notorious characteristic of the country, and so far as the production of open wire lines, which shall have a reasonably neat and tidy appearance, many of the European nations are decidely in advance of this country. Some of the German methods which use exclusively iron and steel shapes are well worthy of being copied in America. Of these, a recent German publication gives some excellent examples. Figures 1 and 2 show respectively an elevation and plan of fixtures advantageous to use upon the side walls and corners of buildings. These fixtures are made of flat strap iron, half an inch thick, and from an inch and a half to two and one-half inches in width, depending upon the number of pins that is desired to have the fixture support. The insulators are held upon iron pins which consist of a piece of wrought iron about one-half inch in diameter upon the lower end, in which a collar is welded, a thread cut, and a nut supplied. The upper end of the pin is secured in the set by setting it in plaster of paris. Figures 3 and 4 are representations of iron construction, which may be applied either to house top fixtures, or used for poles in the street. The poles are made of wrought iron pipe, in a manner very similar to that in use by the street railway companies, both for telephonic purposes. A lighter and smaller pole may in some cases be used, as it is not subjected to the stress of a mere trolley wire. For street work the pole should be composed of from three to four sections respectively, of 6, 5, and 4-inch pipe, shrunk together at the joints. The cross-arms are made of flat strap iron, half an inch thick, and from two and a half to three inches in width. The cross-arms are bolted together with spreaders at intervals at 18 inches or two feet, while the insulators are set upon iron pins in a manner very similar to that used for house top brackets, and secured to the cross-arms, as shown in the illustration. Where only one or two insulators are to be supported, the bracket method, as shown in Figure 4, is a simple and efficient solution of the problem.

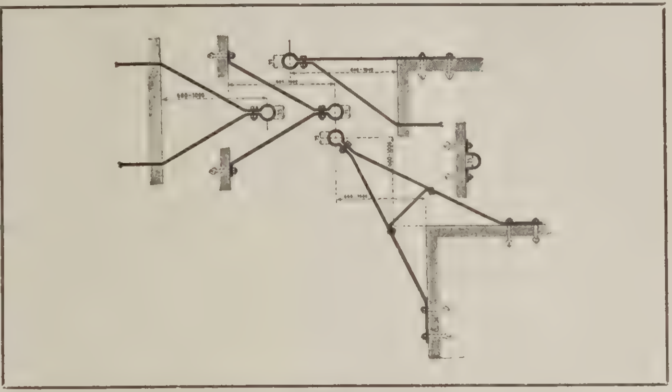


Fig. 2.

THE ROMANTIC TELEPHONE AGAIN.

AT the bottom of another Indiana romance is the telephone. Miss Maybelle Mund, of Ora, was visiting friends in Rochester, Ind., and one day while using the telephone, central gave her the wrong number by mistake and Luthur H. Bibler, city editor of the Rochester *Sentinel*, answered the ring. It took some little time for the parties at each end of the wire to come to understand that there was a misunderstanding, but before they got through apologizing to one another for having taken up one another's time, they had become pretty well acquainted. Mr. Bibler rather enjoyed the incident and next day called up—to do some more apologizing, it is to be presumed, and in due time called on Miss Mund personally to emphasize his apologies. That was last May. Last week they were married. It is apparent that in doing the wrong thing, the girl at the exchange did the right thing, that time.

Fig. 3.

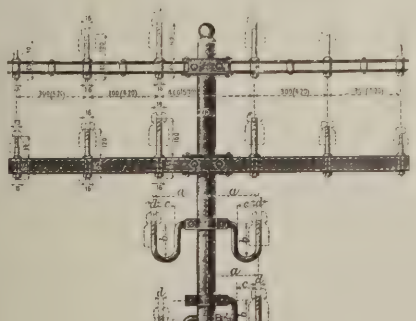


Fig. 1.

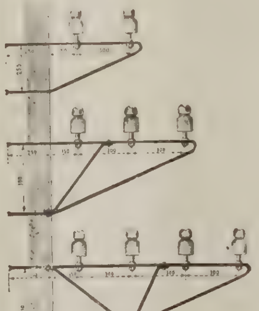
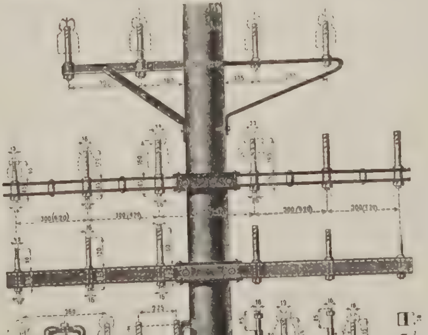


Fig. 4.



The Editor's Page

WHY THE INDEPENDENTS STARTED.

On the western edge of Chicago, in plain view of the thousands who daily pass on the Chicago, Burlington & Quincy trains, an immense steel building is slowly assuming form. Those who are curious enough to inquire are informed that it is to be the new plant of the Western Electric Company. The question might naturally be asked, why should the Western Electric Company operate this great factory with its acres of floor space and at the same time allow its president to operate the smaller plant near by, that of the Kellogg Switchboard and Supply Company. That would seem a very poor business policy to pursue in this era of consolidation. It is not reasonable to suppose that when the new factory is completed the company will long continue to operate both plants, especially as by that time the purchase of the Kellogg Switchboard and Supply Company will be thoroughly understood in all of its bearings.

Certainly the Kellogg company will not then expect to secure the business of the Independent operators. Yet, the Kellogg concern to-day is just as much a Bell adjunct as it ever can be and the Independent operator ought to be just as charry of getting tangled up in the uncertainties of the Kellogg equipment, as if it was posing as an out and out Bell company. The relations between the manufacturers and the operators ought to be very close. The operator looks to the manufacturer to protect him in his rights. It is yet to be explained how a Bell concern, even if pretending to be Independent, can serve two masters. Surely, no one will contend that the interests of the Bell Telephone Company and of the Independent operators are the same. Until the mask of secrecy which so long concealed the purchase was removed, the Kellogg concern, by posing as an Independent company, could play into the hands of the Bell people. But that time has passed. The eyes of both operators and investors are opened. They know why the Kellogg company was purchased. They know why the fact of the purchase was kept secret so many months. And they know better than to load themselves up with an equipment purchased of a company owned and controlled by their great business rival and enemy. In buying a new sewing machine, for instance, one does not knowingly buy of a company which is certain to soon go out of business and become unable to supply any needed parts.

IF HINDSIGHT EQUALED FORESIGHT.

There is a homely, old saying, that if one's foresight was only equal to his hind sight, he would get along with less trouble. But this does not apply to the Bell people who seem unwilling or unable to learn from experience. Sitting in their palatial Boston homes, they apparently regard the residents of the great west as a lot of Indians. Consequently this same west has become the hot bed of Independent telephony. As a matter of fact, there was no need of permitting a competing line to grow up in the west or anywhere else. Here is where the Boston financiers made a huge mistake. Instead of using the Independent lines, making them feeders and sources of revenue they sought to stamp them out, frighten them off, litigate them entirely out of the telephone field, sandbag them out of existence.

To illustrate, a few years ago an enterprising business man with a great foresight and a little capital, constructed an Independent telephone line in the town of Lockport, Illinois. He preferred to own his own instruments and objected to being robbed of a part of his stock, but otherwise was not hostile to the Bell interests. When his exchange was ready to operate he at once sought out the officers of the Chicago Telephone Company and tried to get permission to connect with their system. They laughed at him. The idea was absurd to them. "Go ahead and put in all of the telephones that you want to," they said, "they will be valueless without a connection with us. You must think we are crazy."

So the man went ahead. There was nothing else to do, for he wanted an outlet. That was the beginning of what is now the Interstate Independent Telephone and Telegraph Company with ten thousand telephones in the state of Illinois and a toll line which will soon reach from Chicago to St. Louis, and across the state laterally, with every Independent system in the state as a feeder. This immense business has been diverted from the Bell companies by the insane methods employed.

The experience in other states and communities has been similar and the consequent growth of the Independent movement has been phenomenal, until we stop to analyze the cause. Why should not the Independent field be an inviting one to the capitalist? The Bell companies from the start have been robbed of a controlling interest of their capital stock by this parent company and forced to pay a fancy price for switchboards, besides a royalty on all instruments in use. Every Independent telephone is owned outright and the companies are privileged to buy in the cheapest market. The Bell companies are managed from a distance and by strangers. The Independent systems are largely owned locally by the substantial business men of the several towns, whose influence is invaluable both in securing business and in the direction of economy. These companies own their own stock. And so we might go on in the analysis of the causes which have led to the multiplication of dividend paying, Independent systems and, by the same token, to the bankruptcy or decay of Bell companies.

The telephone is playing a great part in the social and business economy of the people; it is a necessity; it is helping solve the problems of the rural home and of farm life. And the Independent companies exist to-day simply because the Bell company failed to rise to its great opportunity. In certain States, by cunning manipulation of legislatures, the door has been temporarily closed to the Independent movement. But in the west particularly it is wide open and in the west therefore the movement is most active.

CONTEMPORARY CROSS-TALK

By "The Listening Key."

THAT the divided board will come back into use sooner or later there can be little doubt, and in summing up the considerations that seem to call for it three general propositions may be advanced. First, that it will become absolutely necessary in course of time to devise means for distributing *traffic*, instead of merely distributing lines, as we do at present. Second, that the divided board must be a divided *multiple* board, for the multiple principle is far too valuable and economical a feature of telephone switching ever to be given up. Third, that the present simplicity of the subscriber's station and of its working, which has been attained by the central energy system, must be retained intact. To these three broad conditions, that must always be kept in mind, may well be added a fourth, which is that the general efficiency and promptness of the service must be kept unimpaired, if anything, improved. This applies most particularly to the answer to the line signal and also to the disconnection. The answer to the call is what subscribers notice the most, and the prompt disconnection is perhaps the second important point in operating, since it tends to reduce the "busy" trouble. Over the time of getting into actual communication it is the subscriber himself, that is, the called subscriber, who exercises the chief control. If telephone subscribers as a body can be brought to recognize this, the rapidity of the service will become positively startling.

The Distribution of Traffic

THE effective distribution of traffic is a difficult problem. It would not be too much to say that it is the most complex problem that faces us in telephony—with the single exception, perhaps, of the making of rates that will satisfy both the public and the supplier of the service. The ideal distribution of traffic would be an arrangement that would permit of having at any time exactly as many operators, and no more, as would suffice, each operator working at full speed, exactly to handle the traffic flowing. At night, for example, there would be only one operator at work in the largest exchange, since at night there are never more calls per hour than one operator could easily handle, if all calls came to one position. This ideal distribution implies movable line terminals and signals, which are manifestly impossible, or some automatic means of distributing calls to the position or positions occupied, irrespective of the normal position in the board of the terminals and line signals of the lines making the calls. This automatic call-distributor can hardly be said to be impossible, but its appearance in practical working shape is not to be looked for in the very near future. That is, unless some of the inventive readers of the A. T. J. set to work on it at once.

A Step in the Evolution

PENDING the appearance of the automatic distributor we may well consider whether, by a modification of our present style of switchboards, we could not achieve a more effective distribution of the daily traffic and so secure a distinct economy in operating expenses. Such a measure would be but another step in the evolution of switchboard design, which scientific study of telephone traffic has brought about. At first all lines were connected direct to the switchboard, irrespective of their traffic characteristics. This gave very unequally loaded positions, as one position would have all large users and another all small. The intermediate distributing-frame was devised to remedy this difficulty and has proved of enormous value, as it enables the answering position of any line to be readily changed from one part of the switchboard to another. Thus heavily-used lines can be mixed in with lightly-used lines and a certain measure of equality of load secured to each position. But we are still only distributing lines and not really distributing traffic. The next step in the evolution of the switchboard will be some attempt to grapple with the problem of a real distribution of the traffic. It is difficult to see how this is to be done except by dividing the board, reducing the number of answering positions and increasing the number of lines per answering position while reducing the amount of work required of an operator to answer each call. The attack on the problem will probably take some such shape as this; the automatic distributor will probably come along a bit later.

Line Signals in Tandem

IT has been suggested, I forget by whom, that each line should have two answering-jacks and line lamps in tandem, as it were, one jack and signal at each of two positions. When a call came in both lamps would light and the call would be taken up at whichever position was able to answer it at the moment. Thus at each of two positions there would be, say, five hundred line signals and answering jacks, each set of five hundred being duplicates of the other. At slack times there would be an operator at only one of the two positions and she would answer all calls. At busy times there would be an operator at each position, and, all calls appearing on both positions, one operator would answer calls from 0 to 249 and the other would answer calls from 250 to 499. This scheme, although it has the advantage of economy during slack times, has the disadvantage of requiring two answering jacks and lamps for each line. This would naturally add a good deal to the cost of the switchboard equipment for each line and would cut down the saving made by doing away with the multiple jacks at the answering positions.

The Multiple For Ever

THAT the multiple principle must be retained at the connecting part of the board is quite clear. Nothing can conceivably be devised that will be an improvement on the multiple principle as a quick means of connecting together any two out of many thousands of lines. With improvements in manufacture, the enhanced reliability of the "test," and the high pitch of skill that has been attained in the assembling of the myriad parts and in the accurate and substantial construction of the intricate mass of wiring required, the multiple telephone switchboard of to-day is as perfect a piece of electrical apparatus as the industry can show—a triumph of electrical engineering. It accomplishes practically what no other piece of machinery accomplishes—it puts a thing in two places at once, in fact, in several more than two. If it were not for this peculiar and invaluable feature of the multiple board—the repetition of the terminal of a line at a number of different points—telephone operating would be bungling, slow and laborious work. With it any operator having a connection to make can immediately approach a terminal of the line wanted and discover in an instant whether it is available for connection or otherwise engaged. It is not too much to say that without the multiple board it would be absolutely impossible to give the rapid and cheap telephone service that is now given to large masses of telephone subscribers in our great cities.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

REASONABLE REGULATIONS.

IF we adopt a rule that our company will not undertake to transmit or deliver messages beyond the line and will not be responsible for them, and that if any of our employees help persons talking over our lines the risk will be on the person using the telephone and not on the company, will not that rule be a good protection to us? Cannot we make a rule that when messengers are sent out we shall not be responsible for their mistakes? It would save us lots of trouble, as messengers are not reliable. L. G. B.

YOUR rule would be some protection to the company but not so much as you wish. A telephone company can adopt reasonable regulations for the conduct of its business and may protect itself so far as necessary. It is, however, a common carrier of information and is under obligations as such to serve its patrons impartially and well. In particular it must render such service as it holds itself out, or offers, to render and cannot legally stipulate for exemption from liability nor relieve itself, by conditions, from the obligations it owes its patrons. In a case where notice of a rule similar to the one you propose was posted conspicuously in the office of the company, the court held that if the regulation constituted an attempt on the part of the company to exempt itself from liability for the conduct of its messenger, it would be in violation of the company's duty to the public and void. But the court interpreted the rule, not as an attempt to escape liability, but as a provision that the company would not undertake to transmit and deliver verbal messages beyond the telephone stations. The negligence charged upon the company in that suit was a failure, due to the carelessness of its messenger, to bring a person to the telephone to be placed in communication with another party who had called him up, and for this failure the company was held liable. "We grant," said the court, "that if the company had adopted a rule that it would not undertake to call persons to the telephone whose place of business or residence was so remote from the station as to render it unreasonable that they should be required to find them, then such a rule would be reasonable and could be enforced." See Central Union Telephone Company v. Swoveland, 42 N. E., 1035; 6 Am. Elec. Cas., 679.

To recapitulate briefly:

A rule would be invalid that when messengers are sent out the company shall not be liable for their mistakes.

A rule would be valid that the company will not transmit verbal messages beyond the telephone stations.

A rule would be valid that the company will not call persons to the telephone if unreasonably distant from the station.

It is the writer's opinion that a regulation forbidding employees to assist in conversation would be valid. If an employee did so assist and made a mistake, his error could not be laid at the company's door because he had no authority to take part in the conversation as he did. Notice of the rule would have to be brought to the patron's attention in this case.

OWNERSHIP OF WIRE.

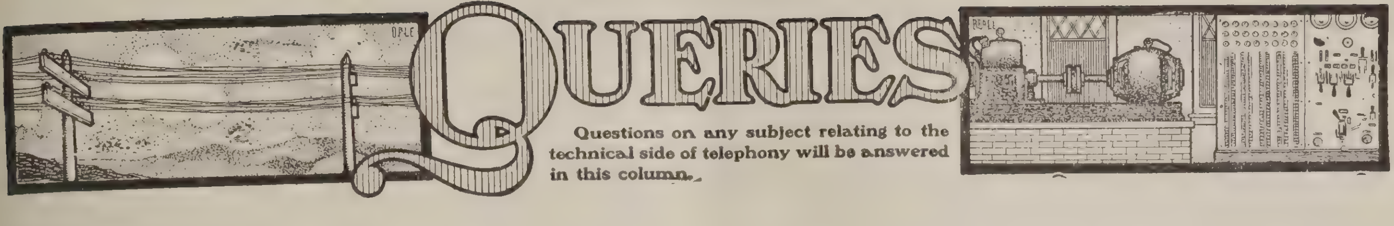
THE Supreme Court of Maryland has affirmed a judgment in favor of the defendant in the case of Lee v. Maryland Telephone & Telegraph Company of Baltimore City. The action was brought for injuries to plaintiff by tripping over a telephone wire lying concealed in the grass in the street. One end of the wire was attached to a telephone pole. The question in the case was whether defendant owned the wire. It was conceded that it did not own the pole, which was one of a system of electric light poles in which defendant had no interest, but plaintiff contended that defendants were assignees or successors in title, to the persons who originally strung the wire for the purpose of a former telephone connection. Plaintiff showed by testimony that it was understood at the time of the assignment between the parties that the company became the owner of the electric equipment and wires which had been owned by the individuals who composed it, but there was no formal or written transfer of the property from the individuals to the company. This evidence, said the court, was not sufficient to justify a finding that defendants owned or were in control of the wire at the time of the accident. "If it was the intention of the incorporators to transfer their wires and plant to the company in payment for its capital stock, there is a total absence of evidence of a compliance by them with the method of procedure which the law declares to be essential to the effectual accomplishment of that purpose." Lee v. Maryland Telephone & Telegraph Co., 55 A., 680.

STORM DOES NOT RELIEVE FROM LIABILITY.

THE Supreme Court of Michigan, in the case of Friesenham vs. Michigan Telephone Company, has reversed the decision of the lower court, which directed a verdict in favor of the telephone company. The company, in stringing a wire around an angle in a street, erected a guy wire to stay the pole at one end of the elbow to prevent the pole being drawn over and the wire sagging. The guy wire was fastened near the top of the pole, and extended to another pole, located between the sidewalk and the curb, fastened about ten feet from the ground, crossing above the pavement. The plaintiff was injured by his wagon coming in contact with the wire in the daytime, which had then sagged to within a few feet from the ground. Defendant contended that the sagging was due to an exceedingly severe storm, which had been very destructive to poles and wires within the city, and that it had procured all the help possible, in addition to its regular employees, to repair the damage, and that it had no notice of the sagging of the wire. The court held that the questions of the defendant's negligence and the plaintiff's contributary negligence were questions for the jury. Friesenhan vs. Michigan Telephone Company, 96 N. W. 501.

BARRED BY LIMITATION.

IN the recent case of Poff v. New England Telephone & Telegraph Company, the Supreme Court of New Hampshire, construed the statute of that state providing that if an action for injuries to a person is not pending at the time of his death and is not already barred by limitations, an action may be brought at any time within two years after decedent's death. The court held that the limitation of time in such statute did not relate merely to the remedy but was part of the right which the statute created, which did not exist at common law, and hence, where an action for injuries resulting in death was not brought within the time limited, it was not maintainable. The court accordingly sustained a motion for non-suit. Poff v. New England Telephone & Telegraph Co., (N. H.), 55 A. 891.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

COST OF INSTALLING GUY STUBS.—(226.)

Will you kindly inform me as to the average cost for labor to install the old fashioned dead man, used to hold anchor rods? V. P. O.

It is somewhat difficult to answer this question accurately on account of the various prices of labor in various parts of the country, and the different amounts of time required owing to quality of soil encountered. In a general way, it may be said that the time required to dig the necessary hole for the dead man will consume about half a day for two men. Where the soil is stiff and hard or where clay and boulders are encountered, much greater allowance of time will be necessary. With wages at $1.50 per day, the cost of digging the hole will be about $3.00, and about a quarter of a day more would be required to set the dead man, make up the strand, and re-fill the hole. Under ordinary circumstances, each guy will cost from $3.00 to $5.00 for labor.

CONNECTING LINES BY A REPEATING COIL.—(227.)

Fig. 227 shows the conditions of our system. In the city there are trolley and electric light systems. We want to know if the metallic line, which is 25 miles long, will work satisfactorily when connected to the grounded lines through a repeating coil. The grounded lines run only to villages where there are no disturbing electric influences.

What kind of a repeating coil would be best?

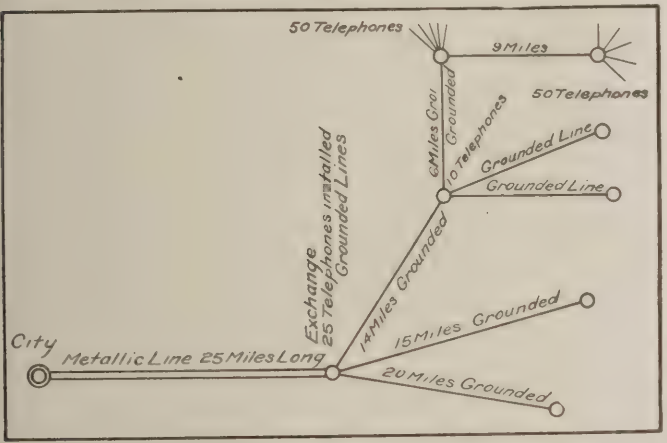


Fig. 227.

Would the induction from the electric plant collect on the metallic line when the metallic line is connected with the grounded lines? L. C. S.

It is very probable that you would get satisfactory service as far as noise on the line is concerned, by connecting through the repeating coil as you suggest. There is no apparent reason why you should not, provided the metallic line is well built and properly transposed.

The kind of repeating coil to be used depends on whether you wish to simply talk through it, or to both talk and ring through it. Write and state your needs to one of the reliable manufacturers and he will be able to give you the kind of repeating coil you require.

If the metallic line is properly transposed, we see no reason why it should be noisy when connected to a grounded line through a repeating coil.

WHAT TO CALL A MESSAGE.—(228.)

Please let me know what shall we call a message sent by telephone. Y. T. S.

On page 9 of Vol. I. of "Telephony," by Arthur Vaughan Abbott, we find the following: "*Message,* often called a *call* or *connection.* The act of signalling the central office, also the conversation which takes place between two subscribers. Messages are divided into (1) originating messages, or those which are made by subscribers in signaling the office to which they are attached, and (2) trunk messages or such messages as proceed from the office in which they originate over trunk lines through some other office to the called subscriber."

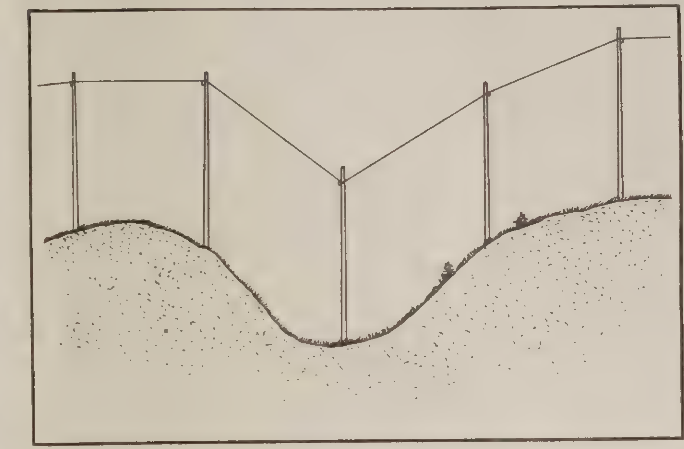


Fig. 229a.

GRADING A POLE LINE.—(229.)

What is meant by grading a line of poles? C. B. D.

We take it that you refer to so grading the heights of the poles so that there will be no sharp vertical bends in the line wires. Fig. 888a and 888b show respectively a line composed of ungraded and one of graded poles. The faults of the ungraded line are apparent. There is a great down strain on the poles on the crests of hills and there is a tendency to pull up the poles in the bottoms. The wire is apt to pull from the insulator or the insulator itself is apt to pull from the pin. By arranging the poles as shown in the second figure, it is possible to nearly equalize the vertical strain on all of the poles, which obviously is much better engineering.

CHANGING A SWITCHBOARD LOCAL TO C. B.—(230.)

I have a magneto switchboard and would like to put in a lamp signal system. Please give me a rule for calculating the current and a diagram of circuits. C. A. S.

It would be impracticable for us to give you a diagram of circuits that would in any way be likely to fit your switchboard. It is highly improbable that you could change your board to a lamp signal system without tearing it entirely to pieces. If you desire such a system we would advise you to buy a new switchboard. The average amount of current used by common battery lamp signal switchboards is about 240 Watt hours for a hundred calls. This is estimated on an average time of 1.75 minutes per call. This is at the battery and does not include the losses in the charging generator.

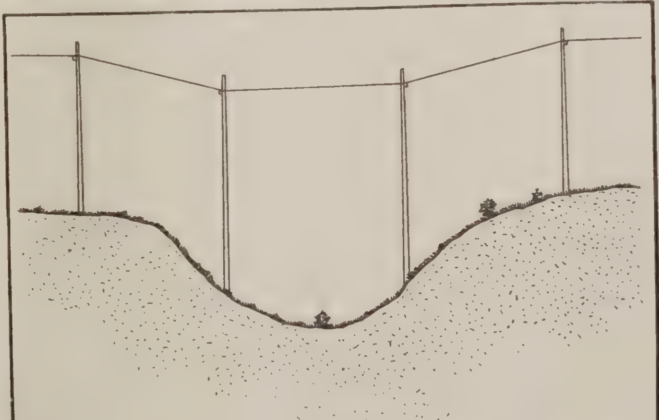


Fig. 229b.

BELL LOWERS UTICA RATES

By W. H. Campbell, *Special Correspondent.*

As predicted in The American Telephone Journal some weeks ago, the Central New York Telephone & Telegraph Company, of Utica, N. Y., has reduced its rates on certain classes of lines and has practically abolished the measured or limited plan for residences. The company was obliged to do this or else lock its doors, because the superior service of the Utica Independent company was recognized, and the number of subscribers on the Bell list was fast decreasing. It has been a merry war since the Independent company started giving service and the result has been anxiously awaited by hundreds of business men and others in this vicinity. The Bell people are advancing the argument that because of the completion of an extensive cable system, reaching into all sections of the city, they lowered the rates, but this is absurd. It was really necessary for them to lower rates and had it not been done before Nov. 1, when many of their contracts expire it is probable that more than half of the telephones would have been removed from not only residences, but business houses as well.

As the matter stands at present, the Bell rates are not as low as those of the Independent company. The price for the special or straight line residence instrument has been $45, and that for duplex, or party line, has been $33. The straight line telephone will be reduced in cost to $33 per annum and the party lines, with unlimited local service will cost but $18. In the first case the reduction is $12, and in the second, $15. The Home company charges $22 net for a straight line telephone. Of course the Bell people show smaller figures on the duplex lines, but then there is a great disadvantage of the party line. W. W. Nicholson stated recently that since the Independent company started several hundred telephones had been taken out. Also stated that in the development of the business it has been deemed unwise to continue the so-called "measured service," at residences, for the reason that the limit put upon the user has not been altogether satisfactory. The Bell company may be able to regain a little of its lost trade, but it is a fact that it cannot add any telephones to its switchboard. The board is inadequate.

A TEST OF TWISTED JOINTS IN GALVANIZED IRON WIRE*

By Warren Simmons and Terrell Croft.

In practical line construction there are several types of twisted wire joints in use, each of which has its advocates. The intention of this investigation was to find, if possible, which of these is the stronger and better, and at the same time to find the dimensions for the most efficient splice for each of the sizes of wire generally used. The joints were tested unsoldered at first, as in many cases this is advisable, especially where the wire is used only to support a strain, as in guying where the electrical conductivity is not involved. Unfortunately in the laboratory it is impossible to exactly reproduce conditions met with in practice. As a rule, when wires are broken out on the line, rupture is caused by a sudden strain such as a tree falling on the middle of a span or a pole toppling over. In these cases the strain is applied so suddenly that probably the wire would break before a joint would have time to untwist, even if made ever so poorly. It is practically impossible to measure in the laboratory the force of a sudden blow, so the joints could not be tested in this way. But the tests were made on an Olsen testing machine, on which the load steadily increases until the specimen breaks. A machine of this kind reproduces such a strain as a guy wire would be called upon to sustain, or as would be caused by changes of temperature. At any rate, when we have a joint that will sustain as much as the wire itself, we have all that can be desired of it, and the tests were therefore made to find out how the different joints compared in tensile strength with this standard.

TABLE 1.

No.	No. of short wraps.	Breaking load.
1	3	198 pounds
2	3	242 "
3	4	264 "
4	6	266 "
5	8	240 "
6	10	247 "

In the accompanying plate (Plate 1) are shown types of joints in use. From the illustration it is evident that there are two factors entering into the twisted joint: First, the short turns around the wire at each end, and second, the long twists in the middle or the "neck." The effect of each of these was tested separately. No. 12 iron wire, which was found to break at 475 lbs. was used in preliminary tests. To find the effect of the short turns, the tests shown in Table 1 were made. The specimens were all wrapped with one twist in the necks, and the short turns at the ends were varied as stated in the table. The results shown are the average of several tests for each type of joint. In breaking the joints, with three exceptions out of the thirty-five tested, the joints untwisted down to one short wrap before they broke.

When a strain is applied to a connection of this type, the wires are gradually pulled apart, the length of the joint decreasing, the short turns revolving about the main wires as the tension is increased, and usually, if the stresses are continued, the wires will untwist entirely, although in some cases, especially in the larger sizes, they may break when there are but two or three of the short turns left. From the results it is evident that it would be impossible to make a joint of this type, of reasonable size, whose strength would even approximately be equal to that of the wire of which it was made. Also increasing the number of short turns above four or five does not strengthen the splice materially.

To find the effect of the twists in the neck of the joint the tests shown in Table 2 were made. Specimens for these tests were all wrapped with two short turns at each end, and the twists in the neck were varied, as shown in the table. In each case a neck four inches long was used, this being considered the average length used in practice for No. 12 wire, its length being in about the right proportion to this size wire. It is evident from table 2 a safe joint, that is, one that will hold as much as the wire of which it is made, should have five or six twists in a four-inch neck.

TABLE 2.

No.	No. of twists in neck.	Breaking load.
1	3	230 pounds
2	4	230 "
3	5	475 "
4	6	475 "

Where four turns or less were used, the joint would start to slip at a load something like one-half the breaking load of the wire; would continue to slip at this load or less until it untwisted entirely, or after having pulled down to the short wraps would break. An example of this is Fig. 4, Plate 1, which shows a specimen of No. 6 wire that had four twists in a seven-inch neck before being placed in the testing machine. At time of breaking these had pulled entirely down to the short wraps. When a wire breaks after having untwisted from a joint such as the one shown in Fig. 4 was originally, the breaking strength is a little over half the breaking strength of the uninjured wire.

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* The tests recorded in the article were conducted in the electrical laboratory, at Pratt Institute, Brooklyn, N. Y., in 1902, under the direction of the electrical department of the Institute, and are reprinted from the Pratt Institute Annual.

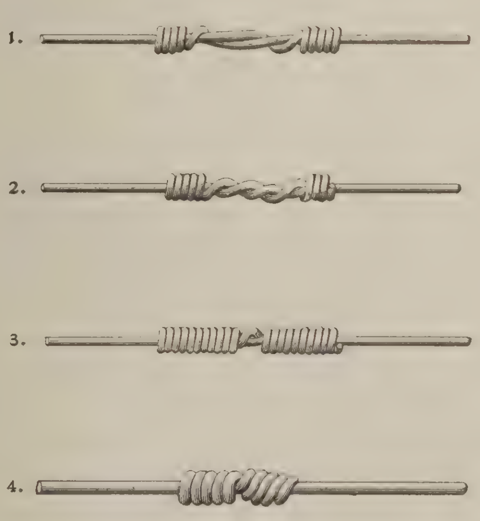
The joints shown in Plate II. were made in accordance with above conclusions, and are probably the most efficient joints for the sizes of wire used. As a few short turns at the ends undoubtedly increase somewhat the strength of the splice and add to its appearance, five of them were placed at each end. Judging from results obtained, there is no benefit from increasing this number. After the described tests on No. 12 wire were completed, the other sizes, viz., No. 14, No. 10, No. 8, No. 6, were taken up. The object sought in the tests on these sizes was to find the number of twists in the neck of the splice necessary to make it as strong as the wire of which it was composed.

TABLE 3.

No. 14 wire	3¼	inches
No. 12 wire	3½	"
No. 10 wire	4	"
No. 8 wire	6	"
No. 6 wire	7	"

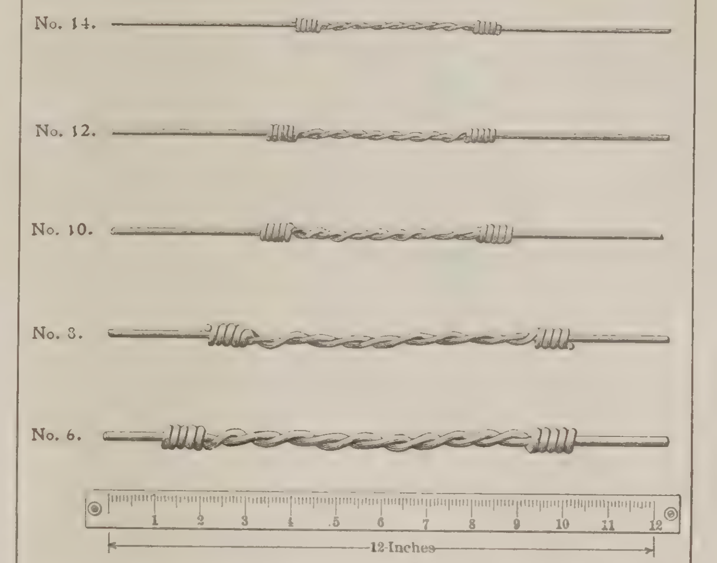
The results for the different sizes of wire were so nearly the same that it does not seem necessary to treat each size separately. It was found that for all sizes of iron wire tested, in order to make a splice of a strength equal to the wire of which it is made, there should be at least five twists in the neck and about five short turns at each end, although joints made with but two or three short turns at the ends often appear to hold as well as those made with more. In determining the length of the neck there are two things that it seems necessary to consider: If the neck is made too short it will not be possible to make the five turns in it (which, judging from results obtained, are necessary) without either "burning" the wire or exercising an unnecessary amount of labor; and, secondly, if the neck is made too long, wire will be wasted, and after a certain limit the joint will be weakened. In other words, the proper length of neck is the shortest length that will contain five twists without injuring the wire or making the joint too hard to twist. The lengths used in joints in Plate II. are shown in Table 3.

PLATE I



To find what effect soldering had on the strength a few joints were soldered and broken in the machine, and it was found that for No. 14 and No. 12 wire, even a joint with one twist in neck and one turn at each end would hold, if soldered, while the wire of which it was made would break. On account of lack of time soldered joints of other sizes of wire were not tested. The splices used were made in the following manner: First, the ends of the wires to be joined were held in the connectors, and with the fingers a length of the wire equal to the length of the neck wanted was given one long twist around the other wire. Second, the loose end was grasped with the pliers and turned round until the number of twists wished in the neck were formed. Third, the short turns at each end were made.

PLATE II



In making the specimens it was found that unless care was taken to twist the two wires composing the neck equally, more strain would come on one wire than the other, and the joint would slip or break, whereas if the joint had been properly made with an equal twist in the two wires, the wire itself would break before the splice would give. We found, however, that when making a splice, if the connectors were held firmly in one hand and if, while making the twists in the neck with the pliers, they were pulled away from the connectors, putting an equal strain on both wires, the twists could be made to come quite evenly. Referring to the joints shown in Plate I., splices of the type shown in Fig. 1 will first pull together similar to Fig. 3, and then untwist entirely or break. Joint shown in Fig. 2 is all right as far as it goes, but it will probably stand no more than Fig. 1 or Fig. 3. Joint shown in Fig. 3 under strain will untwist entirely or break at a comparatively small load after partially untwisting.

EFFICIENCY OF A TELEPHONE EXCHANGE.

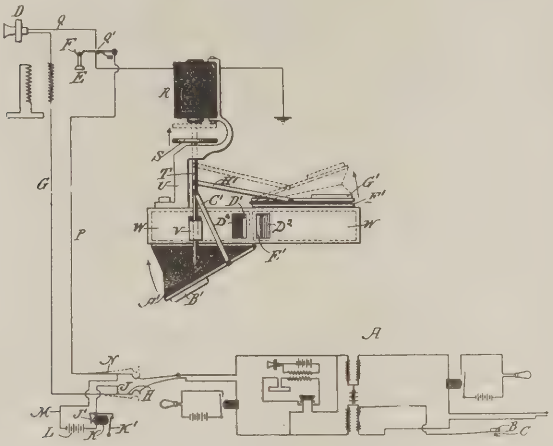
IT is surprising to consider how much apparatus must be installed in telephone exchanges and what a small time any part of it is in use. The following comments are made by J. G. Wray, of the Chicago Telephone Company, on the efficiency of the telephone plant, i. e., the amount of work actually done compared with the work that is possible from the apparatus: "Assuming an efficiency of 100 per cent., when all the subscribers' lines are in use all the time, we find that in actual practice they are working under an efficiency of only 2 or 3 per cent.

"Assuming 100 per cent. efficiency when apparatus used by an operator is in use all the time we find that in actual practice it is working under an efficiency of 25 per cent. Thousands of dollars' worth of multiple jacks lie in the switchboard practically idle. Some are perhaps never used."

PATENTS ISSUED

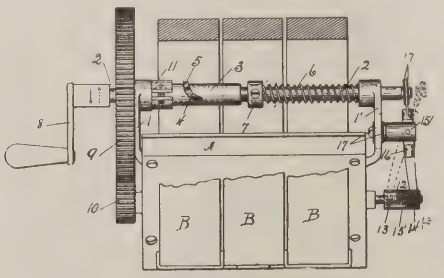
TELEPHONE SIGNAL.

Richard H. Ferguson, Philadelphia, Pa., patents (No. 742,619) and assigns one-half to G. W. Ruch, an improved signaling device. This is illustrated in the figure. The lower contact of the hook switch, *F*, is connected to a magnet *R*. This magnet is provided with an armature *S*, attached to a rod *T*. Upon this rod there are two levers *C′* and *C*, attached. These levers are in turn screwed to a bellows, *A′* and *G′*, obviously when the armature *S* is raised, it also operates the bellows, which are arranged to force air into box *W*. This box is supplied with two reeds or whistles, *O″*. By means of a key the exchange operator can magnetize and de-magnetize the magnet *R*. This causes the magnet to rise and fall and operates the bellows and produces the whistle.



IMPROVEMENT IN RINGING GENERATORS.

Mr. Oliver Higgins, of Napolean, Ohio, patents (No. 741,665) an improvement in magneto generators. The object of this improvement is to provide a generator so constructed that when the crank is turned in one direction, say, right-handedly, the machine will generate the ordinary alternating current, commonly used to ring magneto bells, and when turned in the other direction it will generate a continuous current. This invention relates to the improvement in signalling party lines, and enables the subscriber, by turning the magneto one way, to call the exchange without ringing any other bell, and when the generator is turned the other direction any other subscriber may be signalled. This device is shown in the figure, which is a section. The shaft of the generator is provided with a loose collar *3* that has a spiral slot *4* cut in it. A pin *5* is inserted in the shaft and plays in this slot. The end of the shaft bears against the switch *17*, while upon the armature shaft there is a commutator *13*, in addition to the ordinary collecting ring. If the shaft is turned in one direction the pin *5* is held against the bottom of the slot *4*, and the spring *16* presses upon the collecting ring *14*, and the ordinary alternating current is generated. If the crank is turned in the other direction the collar slides over the pin, pushes the shaft forward, throws the switch *17* to the position shown by the dotted line, and puts the spring upon the commutator *13*, and in this position a continuous current is transmitted.



IMPROVEMENT IN WIRE GRIPS.

Howard D. Hazard, of Yakima, Wash., patents (No. 740,130) an improvement in wire grips to be used on running boards or "come-alongs." This device is illustrated in Figs. 1 and 5, Fig. 1 showing a set of the grips placed on a running board for the purpose of stringing wire, while Fig. 5 is an enlarged detail of one grip. There is a forged frame *15*, upon which two jaws, 6 and 6 are pivoted. These jaws are connected to the hauling chain *2* in such a manner that a pull upon the chain *2* will close the jaws and pinch a wire placed between them through the guide *5*.

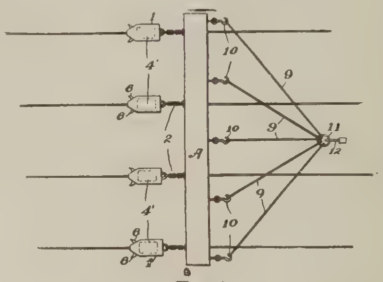


Fig. 1

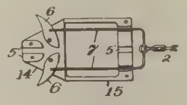


Fig. 5

IMPROVEMENT INSULATOR BRACKET.

James F. Gillilard, of Adrian, Mich., patents (No. 740,005) and assigns to Albert Dick, of Chicago, Ill., an improved bracket for holding insulators. This is illustrated in Figs. 1 and 2, Fig. 1 being an elevation and Fig. 2 a section. The essence of the invention consists in channelling the face of the bracket which bears against the pole as shown at *b* and *c* (Fig. 1). By this channel the edges of the bracket only bear upon the pole and consequently when it is bolted in place, a good fit to the circular face of the pole is secured.

Fig. 1.

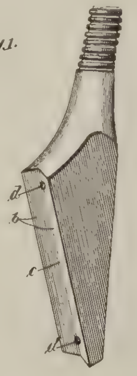
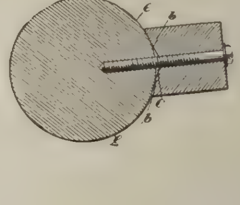
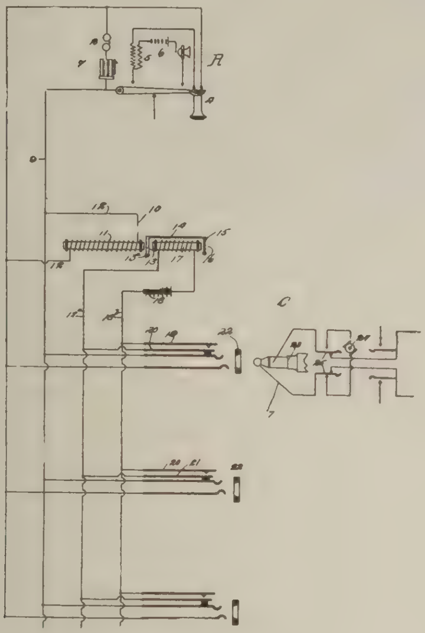


Fig. 2.



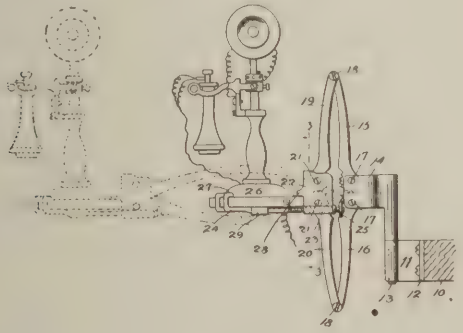
TELEPHONE ANNUNCIATOR.

Mr. Henry P. Clausen, Chicago, Ill., patents (No. 742,165) and assigns to the American Electric Telephone Company an improved form of an annunciator. The object of this invention is to provide an annunciator or drop, the shutter of which shall not fall when the operator plugs into the jack with which the drop is associated. The circuit of this invention is shown in the figure. The annunciator is supplied with two coils—No. *11* and *17*. Coil No. *11* is bridged across the line. Coil No. *17* is in series with a battery, No. *18* and two jack contacts, No. *19* and *20*. When the operator plugs in, the jack contacts No. *19* and No. *20* are closed, and circuit completed through the coil No. *17* and which is excited and locks the armature, No. *16*. The subscriber throws the drop in the usual manner by exciting coil, No. *11*, which attracts the armature, No. *13*, lifting the latch, No. *15*, and dropping the shutter, No. *16*.



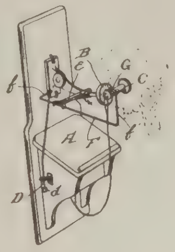
IMPROVEMENT IN BRACKETS FOR SUPPORTING DESK TELEPHONES.

Sanford J. Siefried, of Chicago, Ill., patents (No. 741,382) an improvement in brackets for supporting desk telephones. This invention is shown in the figure which is almost self-explanatory. There is a hinge arm *11* that may be attached to any desired support. This carries a piece *14* that supports the knee joint levers, *15*, *16*, *19* and *20*. By the dotted lines it is easy to see how the telephone set may be pushed in and out or swing to and fro in any manner convenient to the user.



TELEPHONE BRACKET.

Mr. George W. Gande, patents (No. 742,182) an improved form of telephone bracket. This invention is illustrated in the figure. Upon the transmitter arm a bracket *E* is secured. This bracket carries the wire support *F*, one end of which carries a right handled lever *f*, to which a cord is attached, which runs to the switch hook. The other end of this wire support is furnished with a clamp *G*. This supports the receiver *C*. The whole affair is thus adjustable in a bracket *E*. The invention relates to an attachment for telephones, and is in the nature of a support for telephone-receivers designed to be so arranged that the receiver may be held in proximity to the transmitter in a position for use, so as to be engaged by the ear of the operator to automatically, through the medium of suitable connecting instrumentalities, complete the telephone circuit.



THE PRINCIPLE OF THE STORAGE BATTERY.

MANY people have the impression that a storage battery stores up electricity, and that the bottled-up fluid is held somehow under pressure, to be released on demand like highly charged mineral water. The principle of the storage battery is quite different from this, as the entire action is chemical, fundamentally. The storage battery is a simple piece of apparatus, mechanically, says the *Engineering Magazine*. In its most familiar form, it consists of two lead plates supporting active materials, a high oxide of lead for the positive plate, and metallic lead in a spongy, finely divided state for the negative. The plates are immersed in dilute sulphuric acid and contained in a glass jar, or wooden tank lined with lead. Two plates, one positive and the other negative, constitute a couple, and a cell may be made up of as many couples connected in parallel as the requirements of discharge necessitate. That is, all the positive plates are connected together separately from the negative plates which are themselves joined in one aggregation independent of the positives. A battery consists of a considerable number of cells connected usually in series—that is, the positive group of couples in each cell is joined to the negative group of the preceding cell, so that the electric current passes through all the cells in series.

Now, "charging" a storage battery simply means passing a continuous electric current through it from some outside source of supply, as a railway or lighting generator, and thereby causing certain chemical actions to take place. The energy of the current is thus stored up as chemical changes and recombinations, or in other words it is transformed into potential chemical energy. "Discharging" a battery is naturally the reverse of the process just indicated. The battery is connected to a railway, lighting or general power circuit, and it at once begins to deliver current, generated by the reversed chemical actions which begin to take place as soon as opportunity is given for a current to flow. Back goes the battery towards its original uncharged condition, and the cycle may be repeated over and again, always with the same resulting chemical actions caused by, and then producing the electric current.

TELEPHONE CAR DISPATCHING IN AUSTRIA.

AUSTRIA'S first standard electric railway was recently opened. The line extends between Tabor and Bechin, in Bohemia, and has a length of 15 miles. The maximum speed attained is only 19 miles an hour. That passenger traffic is strictly limited in this district of Bohemia may be essayed from the statement that a train consists of only two cars, with a carrying capacity for 40 passengers and 36 tons of goods. The new railway has a special interest from the fact that we believe, says the *Scientific American*, it to be the first line to be entirely regulated by the telephone. There are no signals, the telephone being used by the driver in all cases to ascertain whether the line is clear. Each car is fitted with a portable instrument, which may also be used by the passengers.

The Week's Messages.

FINANCIAL

DENMARK, IA.—The Denmark Independent Telephone Company has increased its capital stock from $2,000 to $5,000.

DUBUQUE, IA.—The Interstate Telephone Company has increased its capital stock from $100,000 to $150,000.

MINNEAPOLIS, MINN.—The directors of the Twin City Telephone Company have declared a quarterly dividend at the rate of seven per cent., payable November 1st.

NEBRASKA CITY, NEB.—The Nebraska City Telephone Company has increased its capital stock from $50,000 to $100,000.

CONNEAUT, OHIO.—The Conneaut Telephone Company has declared a two per cent. quarterly dividend.

SHEBOYGAN, WIS.—The Sheboygan County Telephone Company of Sheboygan has increased its capital stock from $50,000 to $100,000, and has changed its name to the Citizens Telephone Exchange of Sheboygan. M. H. King is secretary, and W. E. Tallmadge, president.

FRANCHISES

HOPKINSVILLE, KY.—A telephone franchise has been sold by the city council to Arthur A. Hoge, of Lima, Ohio, for $310.

NEW BEDFORD, MASS.—The Automatic Telephone Company has presented application to the council of Fairhaven, asking for a franchise.

ANN ARBOR MICH,—The Washtenau Home Telephone Company had its bond of $5,000 accepted by the city council, which is the virtual granting of a franchise to the company.

MANKATO, MINN.—The Lake Crystal village council has passed an ordinance granting a franchise to the Minnesota Valley Farmers Mutual Telephone Company of this place. It is announced that the local company at Lake Crystal intends to combine with the farmers company.

ELDON, MO.—J. H. Stiffler and F. D. Harrison have asked the city council for a franchise.

FORT COVINGTON, N. Y.—The St. Lawrence Telephone Company has been granted a franchise to construct a telephone system here. Mr. Bumstead and A. E. Russell, of Massena, represent the company here.

WHITESBORO, N. Y.—The Utica Home Telephone Company will again petition the city council for a franchise, and as all the citizens of the town are in favor of the granting of the franchise the Council will undoubtedly comply with the request.

PERSONAL

W. B. CARVELL, who is manager of the electric light plant at Allensville, Ky., will also be manager of the new telephone exchange at that place.

JOHN B. PIERCE, general engineer for the Northeastern Telephone Company, was in Auburn and Lewiston, Maine, recently, on business relative to the advent of the Northeastern lines into these cities. He was accompanied by William Graham, foreman of the pole and wire construction.

COMBINATIONS

WRAY, COLO.—The Wray Telephone Company has purchased the lines and system of the St. Francis Telephone Company of St. Francis, Kan.

BALDWIN,. KAN.—The controlling interest of the Baldwin Telephone Company has been purchased by Rev. A. B. Brunner, of Paola, Kan.

UNDERGROUND

MILFORD, MASS.—The New England Telephone and Telegraph Company, by Joseph N. Keller, general manager, is petitioning the board of selectmen for permission to lay and maintain underground conduits.

HELENA, MONT.—The Rocky Mountain Bell Telephone Co., through Harry Sommers, superintendent of the Montana Division, has applied to the city council for permission to construct underground conduits.

CAMDEN, N. J.—The street committee of Camden city councils has voted against allowing any more overhead wires to be constructed within the city limits .

MISCELLANEOUS

VALPARAISO, IND.—A jury in the circuit court of Porter county, last week rendered a verdict for $5,000 against the American Telegraph & Telephone Company in favor of John Green, who fell from a telephone pole and received injuries which will cripple him for life. Green alleged and proved negligence upon the part of the company.

BOSTON, MASS.—The American Telephone & Telegraph Company reports for September:

	1903.	1902.	Changes.
Gross	79,406	75,011	Inc. 4,395
Returns	33,438	43,438	Dec. 9,896
Net output	45,968	31,677	Inc. 14,291
From Jan. 1 to Sept. 30:			
Gross	812,229	898,384	Inc. 3,895
Returns	358,831	346,986	Inc. 12,142
Net output	453,398	461,645	Dec. 8,247

Outstanding, 3,603,718.

The company reports for September its instrument output as 45,968 against 31,677 last year. From Jan. 1 to Sept. 30 the net output was 453,398, against 461,645 last year.

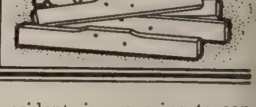
ELECTIONS

JACKSONVILLE, ILL.—The Illinois Telephone Company has elected the following directors: Judge E. P. Kirby, president; A. L. French, vice-president; E. S. Greenleaf, treasurer; R. A. Gates, secretary and auditor; C. F. Dunn, general manager. The usual semi-annual dividend was declared.

OSWEGO, N. Y.—The Ontario Telephone Company has elected the following officers: F. A. Gage, president; George C. Webb, vice-president; and J. K. Whittaker, secretary and treasurer.

KENOSHA, WIS.—The Kenosha Telephone Company has elected the following officers: John C. Brown, president; Eugene R. Head, secretary; Harry B. Robinson, treasurer; Thomas Hansen, general manager. The plant of the company will at once be constructed.

New Construction in the Field



EQUALITY, ALA.—Dr. S. R. Nolan, of Equality, is the leader in a movement to construct a telephone line from Alexander City to Wetumpka, Central, Institute, Equality, Gill, David, Nixburg, Rockford and Weoba.

HUNTSVILLE, ALA.—J. F. Butler and others are constructing a telephone line from New Hope to Whitesburg, where it will connect with the Rice line to Huntsville.

RED DEER, ALBERTA, CANADA.—The Western Telephone Company, of this place, of which John T. Moore is the president, is preparing to construct a central energy system in this town.

ROANOKE, ALA.—The Roanoke Telephone exchange is constructing a telephone line to Wedowee, where it will install an exchange.

TORONTO JUNCTION, ONT., CAN.—The Humber Power & Light Company has been granted permission to construct and operate a telephone system here.

THE WEEK'S MESSAGES—Concluded.

CANTON, ILL.—In all probability a number of farmer lines in this vicinity will soon be connected with the switchboard of the Canton Home Telephone Company.

FLORA, ILL.—The Daniels Telephone Company, of Flora and Inka, is extending its system in Clay and Marion counties. New lines are being constructed to Iola, Oskaloosa and other points.

INDIANAPOLIS, IND.—The Big Four Railway Company is experimenting with the telephone, and service was established last week between the offices of General Superintendent J. Q. Van Winkle, in this city, and those of General Manager C. E. Schaff, in Cincinnati, and will next arrange service between other points for the convenience of officers of the system. The telegraph wires are being utilized for this service by the use of an adapter and specially constructed instruments. The Vandalia Railway has had satisfactory service between this city and Terre Haute for some time by means of the same methods.

KOKOMO, IND.—The Citizens Telephone Company of Kokomo, and the Central Energy Telephone Company of Frankfort, are arranging to construct a line between the two towns.

MUNCIE, IND.—The latest stroke of enterprise for the Delaware and Madison Counties Telephone Company, which has the only underground system in Muncie, and which is making it exceedingly warm for its competitors, is a plan to extend the system in the two counties so that farmers will have toll-line connections with the various systems without additional cost.

COLBY, KAN.—The Colby Telephone Company has completed a toll line to Gem and Halford and will build to Rexford in the near future.

HILL CITY, KAN.—D. P. Simms, of Hill City, is extending his toll line to Edmond.

OBERLIN, KAN.—The Central States Telephone Company of Ohio is extending a toll line to Colby, Seldon, Lind, Rexford and Gem. This company has secured a franchise for a telephone system at Lond Island, Kansas, and will begin operation by the first of the year.

OTTAWA, KAN.—The Ottawa Independent Telephone Company has increased its toll-line connections by some twenty-five stations during the past six months, and new lines are under process of construction.

HEATH, MASS.—W. E. Kinsman, of the Heath Telephone Company, says that the line may be extended to South Ashfield.

ANTRIM, N. H.—The people of East Antrim met recently to consider the organization of a company to construct and operate a local telephone system.

HARPERSFIELD, N. Y.—The Barnum Telephone Company of this place has extended a line to Jefferson. Mr. Barnum, owner of the line, expects to extend lines to Davenport and Worcester in the near future.

BUCYRUS, O.—The Bucyrus Telephone Company is constructing a new rural telephone line in Holmes township, running as far as Wingerts Corners.

RUTLAND, O.—The Rutland division of the Citizens Telephone Company held a meeting here recently. A committee consisting of Austin Eblin, J. B. Holt, and W. J. Lanning was appointed to consider the construction of new trunk lines from Rutland to other points.

TILLANOOK, ORE.—Mr. Tuttle, of the Tillanook Telephone & Telegraph Company, is arranging to extend his system and improve the plant in this town.

APOLLO, PA.—A meeting of the Rural Valley Telephone Company was held here recently, and it was decided to extend its lines from Shelocta to Cockrans Mills and Spring Church.

CLARKSVILLE, TENN.—The Home Telephone Company of this place will open an exchange in Allensville and Olmstead, Ky. The Cumberland Company has an exchange at Allensville, but the people are dissatisfied with the service. W. B. Carvell will be manager at Allensville. He is also manager of the new electric light company E. L. Peck is putting in. The power is from Guthrie. The Home Telephone Company will use the electric light poles from Guthrie to Allensville.

NORTHFIELD, VT.—A meeting of the directors of the Northfield Telephone Company will be held soon to discuss the construction of a new line to West Berlin.

WOODBURY, VT.—The Woodbury Telephone Company has voted to join with the Orange County Telephone Company and extend a line to Hardwick.

FAIRMONT, W. VA.—A meeting of the directors and officers of the Consolidated Telephone Company was held in the offices of General Manager Barnes recently, in which Mr. Barnes was instructed to put up lines from Fairmont to the newly opened part of the city. A new line will also be built from Fairmont to Grafton and one from Grafton to Salem. Other important extensions are being considered by the company.

PORTAGE, WIS.—The Portage Telephone Company announces that, in the near future, it will reconstruct its system.

TRADE NOTES

The Stromberg Carlson Telephone Manufacturing Company announces that its Missouri representative, Mr. H. B. Hewitt, who was formerly located at Keithsburg, Ill., is now permanently located at Chillicothe, Ill.

The Maltby Lumber Company, of Bay City, Mich., announces that for the first time in the history of its pole business, it finds its stock running low on certain sizes this fall. This sometimes happens in the spring, before the poles are out of the woods, but is unprecedented at this time of the year. Of course the scarcity is only temporary and will not affect the filling of orders, but it illustrates the rapid growth of the company's cedar pole business, even during the supposedly dull season.

The Central Electric Company, Chicago, has just issued its November price list and discount sheet, a copy of which The American Telephone Journal wishes to acknowledge. It is an exceedingly attractive little book, designed to supplement the company's 1903 general catalogue. It has been revised to date and contains the very latest prices in force, hence cannot help but be of interest to everyone in the electrical field. Every catalogue owner should have a copy of this sheet.

The Franklin Rolling Mill and Foundry Company, of Pranklin, Pa., claim they can make a good steel pole, ship it to California, realize a good profit and put it on the ground ready for use at about the same cost per pole as for the wooden type. By this it will be seen that the tripartite is bound to become an important factor in all overhead construction, such as trolley lines, electric lighting, transmission of power and in telegraph and telephone construction and all places where a good, strong pole, of enduring longevity, is essential.

The Eureka Electric Company, at its factory at Genoa, Ill., has just perfected an improved apparatus for the purpose of testing each and every generator manufactured by it, and in addition to the testing of its generators, it has devised a very ingenious instrument for the purpose of testing and computing the number of line of force in the magneto generator magnet. The company is now distributing its new Nos. 26 and 27 Bulletins, describing its high grade line of apparatus, beautifully illustrating the same outside of their splendid Catalogue No. 23.

The H. H. Franklin Manufacturing Company, of Syracuse, N. Y., are engaged in making what they call Finished Castings. Usually, when a machine part is required, it is cast in the rough from a pattern, ample metal being allowed for finishing. This is, of course, cut off in the finish. The metal taken off costs money, so does the taking off of it. The Franklin company make castings which are already finished. They are cast in a die from a special alloy. The company says it can save manufacturers lots of money by the process. It issues some descriptive matter that is well worth seeing, which it is glad to send to anyone interested.

The American Electric Telephone Company, of Chicago, sends us a list of exchanges which it has recently equipped with apparatus, both of the regular express switchboard and also of the Bell express type of central office equipment. The following is a partial list of the most recent shipments: Canastota, N. D., 100 line Bell Express; Mt. Horeb, Wis., 200 line Bell Express; Gillespie, Ill., 200 line Bell Express; Little Rock, Ark., 200 line Express; Mound City, Mo., 100 line Express; Effingham, Kan.,

TRADE NOTES—Continued

200 line Bell Express; Topeka, Kan., 25 line Bell Express; Troy, N. C., 100 line Bell Express; Frankfort, Kan., 100 line Express; Wilmont, S. D., 100 line Bell Express.

The International Telephone Manufacturing Company, of Chicago, has recently shipped one of its new type mechanical self-restoring drop switchboards, 150-capacity, to Madison, Missouri, and a similar equipment and telephones to Bevier, Missouri, a 100-capacity fully equipped addition to the present 500-capacity equipment, and a chief operator's desk to Moberly, Missouri, and 50-capacity section and telephones to E. O. Shuman, Jacksonville, Florida.

The American Electric Telephone Company, of 36 West Jackson Boulevard, Chicago, Ill., is placing on the market a new lightning arrester and distributing board for small exchange work. The principle involved is a pencil fuse, having a shell of carbon and a heavy carbon ground plate, the pencil carbon and the fuse being in series with each other, which gives 3 inches of carbon surface besides a 3-inch fuse on every line. All will be mounted on an iron frame and adapted for quick and positive cleaning or repairs. The same principle is applied to individual toll line or telephone protection.

The Chicago Writing Machine Company of 94-96 Wendell street, Chicago, has placed on the market an instrument which it calls the adjustaphone. The device which is illustrated elsewhere in this issue, is a clever combination of a desk telephone and a desk extension bracket. These have been brought together in a sightly arrangement which is light in weight and yet the metal is so distributed that the instrument is stiff and substantial. The heavy portion of the desk stand, the supporting pillar, has been done away with and the hook switch and transmitter and receiver have been rearranged into a well appearing, easily moved combination which should appeal to the strenuous business man of to-day. Best grade German silver is used in the hook springs of the instrument and platinum in the contact points. The hook switch is of special design, arranged in such a way that there is very little movement of the spring so that there is small chance of the springs ever losing their elasticity. The company furnishes transmitters if so specified, but does not manufacture them.

The American School of Correspondence at the Armour Institute, Chicago, reports another notable instance of the efficiency of the modern correspondence school in aiding students to solve problems in actual work. The present occurrence recently happened in Cleveland, Ohio. Mr. George F. Tinkham, for a number of years the engineer of the Upson Nut Company, has, through native skill, and knowledge gained by correspondence study, invented and patented a hydro-carbon device for increasing the efficiency of a brick furnace. It was decided by the officers of the company to determine, by actual test, the merits of the two systems; two of the seven boilers of the plant using this device and the other five using mechanical stokers. The American School detailed its chief of the department of mechanical engineering to go to Cleveland and look out for its student's interests while the test was being conducted. Much credit is due to Mr. Tinkham as inventor. According to his own statement, Mr. Tinkham owes nearly all his knowledge of the theory of engineering to his course with the American School of Correspondence; his boyhood schooling ending when he was eleven years old, and having no other training but practical experience until he took up correspondence work at the age of forty-five.

DAMAGES FOR INJURIES TO TELEPHONE CABLE.

At Waukegan, Ill., the case of the Chicago Telephone Company vs. James Cape & Sons, of Racine, Wis., has been decided in favor of the plaintiff. The telephone company has a 60-wire cable laid from 3 to 5 feet below the old surface of Vine avenue through the viaduct or subway under the tracks of the Chicago and Northwestern Railway Company and the Chicago and Milwaukee Railway Company, which at that point are parallel and in close proximity to one another. Cape & Son did the grading, draining and macadamizing of that street. In putting down their drain tile they damaged the cable beyond repair, so that it had to be replaced. It was for this injury that the Telephone Company recovered damages.

PLANTS FOR SALE

Advertisements under this head $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—A telephone system with 200 miles of line in operation, 325 subscribers, and 200 miles extension needed immediately. Located in a boom town in Northwest Arkansas, WITHOUT COMPETITION, and from which excellent connections may be had with Indian Territory, Joplin, Springfield, and other Missouri points, also Little Rock, Ark. This system is the key to the situation. It pays 15 per cent. annually, with best of prospects of paying 25 per cent. inside of a year. Three new railroads are building; also electric line and two other roads under survey. Good reason for selling. Address, HERMAN H. VER MEHREN, 633 Paxton Block, Omaha, Neb. 96.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

POSITION.—A first-class construction man with thirteen (13) years' experience in telephone (both Independent and Bell) and electric light work, desires connection with a telephone company in its construction department. Will be at liberty Nov. 30. Address, Box 99, The American Telephone Journal, 116 Nassau St., New York City. 99.

POSITION.—Wanted position as Superintendent or Manager of telephone company. Have had 9 years' experience in building telephone exchanges, operating and maintaining. Have just finished 200 miles of toll line and 5 exchanges. Am Superintendent of Construction for Bell Telephone Company at present; 30 years of age, and strictly temperate. Can furnish best of references. Address, P. O. Box 52, Malden, Mo. 94.

WANTED.—A few young telephone men of good character and with best references to do extra work. Liberal compensation offered to the right men. Address, Box 103, care The American Telephone Journal, 116 Nassau Street, New York City. 103.

POSITION.—Switchboard man, five years with Bell, forty-two hundred board, understands motors, power plants, storage batteries and gas engines, desires position with progressive Independent company. A 1 references. Address, Box 101, The American Telephone Journal, 116 Nassau Street, New York City. 101

POSITION.—Position wanted by a practical expert with a company about to build or desiring to enlarge its exchange. Have machinery for manufacturing telephone appliances. Address, Box 95, The American Telephone Journal, 116 Nassau Street, New York City. 95.

MANAGER—A good, live, energetic, capable man of experience wanted to manage a large Independent telephone system in the West. Must be able to invest not less than $10,000 in the company. Address Box 102, The American Telephone Journal, No. 116 Nassau street, New York City. 102

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau St., New York City. 73.

The American Telephone Journal

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VOLUME VIII *SATURDAY, NOVEMBER 14, 1903* *NUMBER 20*

THE PRIVATE BRANCH EXCHANGE

By H. B. Van Sickle.

THE Home Telephone Co., of Toledo, Ohio, has made considerable progress the past year by way of popularizing with many of its subscribers the private branch exchange, thus giving a greater efficiency to their already complete plant. To date, twenty-two private branch exchanges have been installed, bringing into service forty-seven trunk lines and one hundred and sixty-four sub-stations. Considering the fact that few business concerns were enthusiastic on the promised results prior to the placing of the first exchange it can be said that the recent success comes from a determined effort on the part of the telephone company to demonstrate the realizable possibilities.

Prominent among the business houses which are adopting branch exchanges are the large dry goods firms, the largest retail Grocery House, furniture stores, factories, foundries and machine shops, wholesale and retail hardware stores, printing houses, oil refineries, The Street Railway Company, one law firm, and the Board of Education in the High-school building, which has recently installed a board. A visit to the large dry goods store of Lamson Brothers afforded an opportunity to enquire into the workings of their exchange, which has five trunk lines and sixteen sub-stations, giving telephone connection to thirty-five departments located throughout the large building.

Private Branch Exchange in Lamson Bros.' Store, Toledo, Ohio

The switchboard is located on the fourth floor in close touch with the mail order department, which is in charge of Mr. Geo. W. Metzger. Mr. Lamson, a member of the firm and Mr. Metzger were both very enthusiastic over their branch exchange and freely spoke of how important it had become to their business as a time saver in a thousand ways. Mr. Metzger said: "We have four young ladies trained to operate the boards and when we advertise a special sale our customers simply call up this department and order such specials as they may want and it is immediately filled and forwarded to the home of the customer without delay. Having the five trunk lines as we do from the central exchange, there is little trouble met with by our patrons ever being unable to get us. This very seldom if ever happens.

"Besides the advantage of the system as a means of inside communication, much time is saved the heads of the several departments throughout the store. He needs but to step to his telephone and in a moment he can take up an important matter with any other person connected with the store, thereby saving his own time and that of others." When asked if he had ever kept a record of the number of calls received in one day, he said: "Well, yes, we handled on one busy day over five hundred calls; this, of course, included department calls also. An accurate account of outside calls received on a day when there was no special sale on, proved to be one hundred and fourteen." During the noon hour, when the photograph of Lamson Bros.' exchange was made, it was difficult to find enough time between calls to make the exposure. However the result easily demonstrates that this exchange fulfills its mission without question.

Another busy branch exchange is found at Tiedke Bros., the reputed largest retail grocery house in the United States. They have a branch exchange of four trunk lines and thirteen sub-stations and the way the operators of this exchange are kept busy would indicate without doubt that the firm was getting the worth of its money. "The butcher, the baker, the candlestick maker," all of whom might be included in the several departments, find the branch telephone the solution of the problem of how to serve each other and the public promptly.

Mr. Tiedke, one of the brothers, said to the writer, "before the Home Telephone Company established their plant in Toledo, we paid little attention to telephone orders, in fact the service was so unsatisfactory that orders received over the telephone were so liable to turn up mistakes, that we did little to encourage our customers to use the telephone; in fact, we only kept a telephone in our store at the time more to give us connections with our several branch stores than we did for any business we might receive from them. We were slow at first to give an order for a branch exchange, but we find the need of an inside system of some kind, and when the company assured us their plan would prove to be just what we wanted, we finally gave the order. To-day we would hardly know how to get along without the system, and the number of orders we receive over our telephones daily, and the satisfactory service, makes us feel very glad we adopted it indeed. I can sincerely say that a private branch telephone exchange, according to our experience, is most valuable to us. We hardly see how we could do without it."

As is mentioned elsewhere, the Home Telephone Co., of Toledo, is giving this branch of the business considerable attention, and the construction force are busy wiring and installing additional exchanges in the city. It is an impeachable fact, however, that branch exchanges for large firms, no matter of what class of business they may comprise, are becoming a quantity of considerable importance and worthy of consideration.

ANOTHER GOOD TELEPHONE STORY

THE manager of a telephone company in Washington says that recently a prominent citizen of the capital entered his office, and with considerable show of irritation announced that one of the company's live wires had killed a tree on his premises.

"That tree," declared the citizen, "has been standing for thirty years, and I want to say to you, sir, that we looked upon it as one of the family! My children, when they were babies, played under it, and associated with that tree are some of the happiest memories of my life. When that tree began to die, all of us mourned for it as we would for a relative. We could not imagine what was the matter with it until we noticed one of your confounded wires stretched across one of its branches. Your company has electrocuted my tree, sir, and I feel that it should be punished just as though it had done murder!"

The manager says that he felt considerably moved by the righteous indignation of his visitor; so he hastened to send an agent of the company to the scene of the tragedy, with a view of doing all that could be done in the matter. When the agent arrived at the gentleman's place he found that the tree was yet alive, but feeble. Further investigation on the part of the agent discovered the fact that one end of the wire was nailed to the roof of an old barn, and that the other end was twisted around a discarded pole. It had been cut off for at least two years, and forgotten. The agent was of a humorous turn of mind, and this was his report:

"I have to report that the wire complained of is dead, and that the tree is alive. It is evident that the wire was killed by the tree. Under the circumstances perhaps a bill of damages, such as I append hereto, should be sent to the complainant to compensate for the damage done by the tree."

THE CONCRETE BLOCK MANHOLE

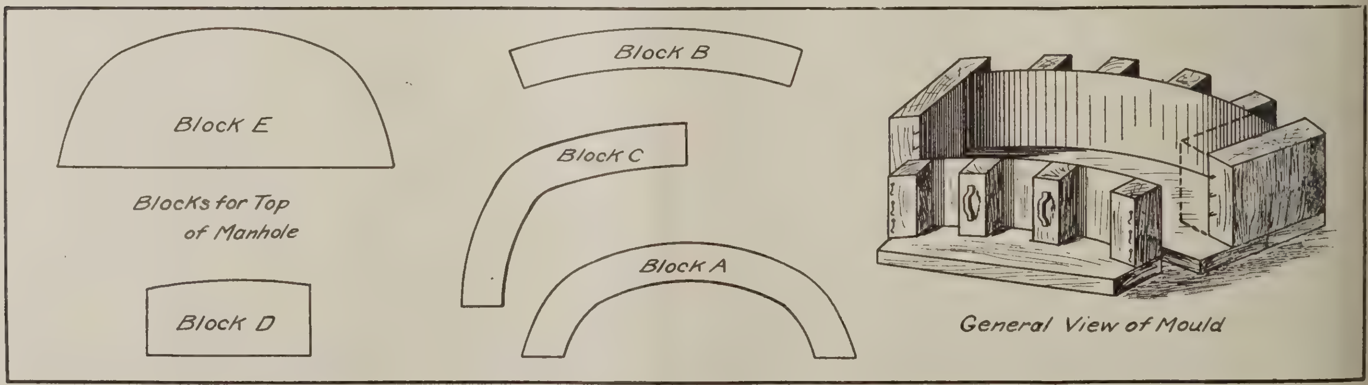
By Harold A. McMann

THE concrete manhole has become quite a factor in underground telephone construction, and while many are familiar with the older type where a wooden mould was placed in a hole in the ground and the concrete tamped in the mould, a general description of another type that has recently been used in some of the cities in the west and northwest may be of interest. In the new type, instead of the manhole being formed entirely at the point where it is to be installed, it is made in the form of concrete blocks which can be put in place much more rapidly than the older type, and the necessity of moving the bulky moulds from one place to another is avoided. The type to be described is known as the block type. This name is given as the manhole is built from concrete blocks which are really large bricks of such shapes that they will, when placed in their proper positions, make the desired structure.

The concrete blocks used are of five different shapes, which are shown in Fig. 2. These are formed in moulds, one of which is shown in Fig. 2, which are constructed of well-seasoned wood and lined with galvanized iron sheets. The frame of the mould is made to the necessary dimensions. A suitable base is first made of two or three pieces of 1" stock. It should be well braced on the bottom with cleats. Next, the end pieces are fastened in position. These should be about three inches thick. The figure shows in detail the construction of such a mould. The front part of the mould is made removable, and is built the same as the backs of well-seasoned blocks and galvanized sheet iron. The inside of the mould is lined with well-galvanized sheet iron, ⅛-inch thick, which is secured by tacking. Hooks as shown in the drawing should be put on the ends for keeping the front piece in place while the concrete is setting. Two handles, to be used in moving the front piece when the concrete is set, are arranged as shown in the drawing. All of the shapes of blocks shown in the figure are made in the same sort of a mould. These moulds can be easily made by the average carpenter.

Concrete for the blocks is of the same proportion as for ordinary subway work. A good proportion is: One part of good

Fig. 2. Drawing Showing Shapes of Concrete Blocks and a Perspective Drawing of a Mould.



cement, two parts clean, sharp sand, and four parts broken stone. The stone should pass easily through a sieve of one inch mesh. It is quite essential that the concrete should be well mixed, and it will be found profitable to pay close attention to this part of the work, as the average laborer is only too anxious to quit the batch he has in hand and start on another before the first is really prepared. A box may be used to measure the sand and stone, and the cement can be measured by the barrel. The sand and stone are thoroughly mixed together first, until in the opinion of the inspector, the sand has been thoroughly covered, *i. e.*, coated with cement. The broken stone is now added, it having previously been well sprinkled with water and the surplus water drained off. The whole is now quickly mixed until the stone is well coated with mortar. Not enough water should be put in to make it rise to the surface of the concrete when it is rammed. The moulds should now be well greased inside and they are ready to receive the concrete. The concrete is well rammed in the moulds with a rammer such as is shown in the initial piece. After the concrete has set for at least twenty-four hours, it may be removed from the moulds and another batch placed in them and moved away to set. In filling the moulds for the top blocks shown in the figure as *Block E,* two pieces of expanded metal are inserted about midway betwen the top and bottom of the mould as shown in longitudinal section in Fig. 1.

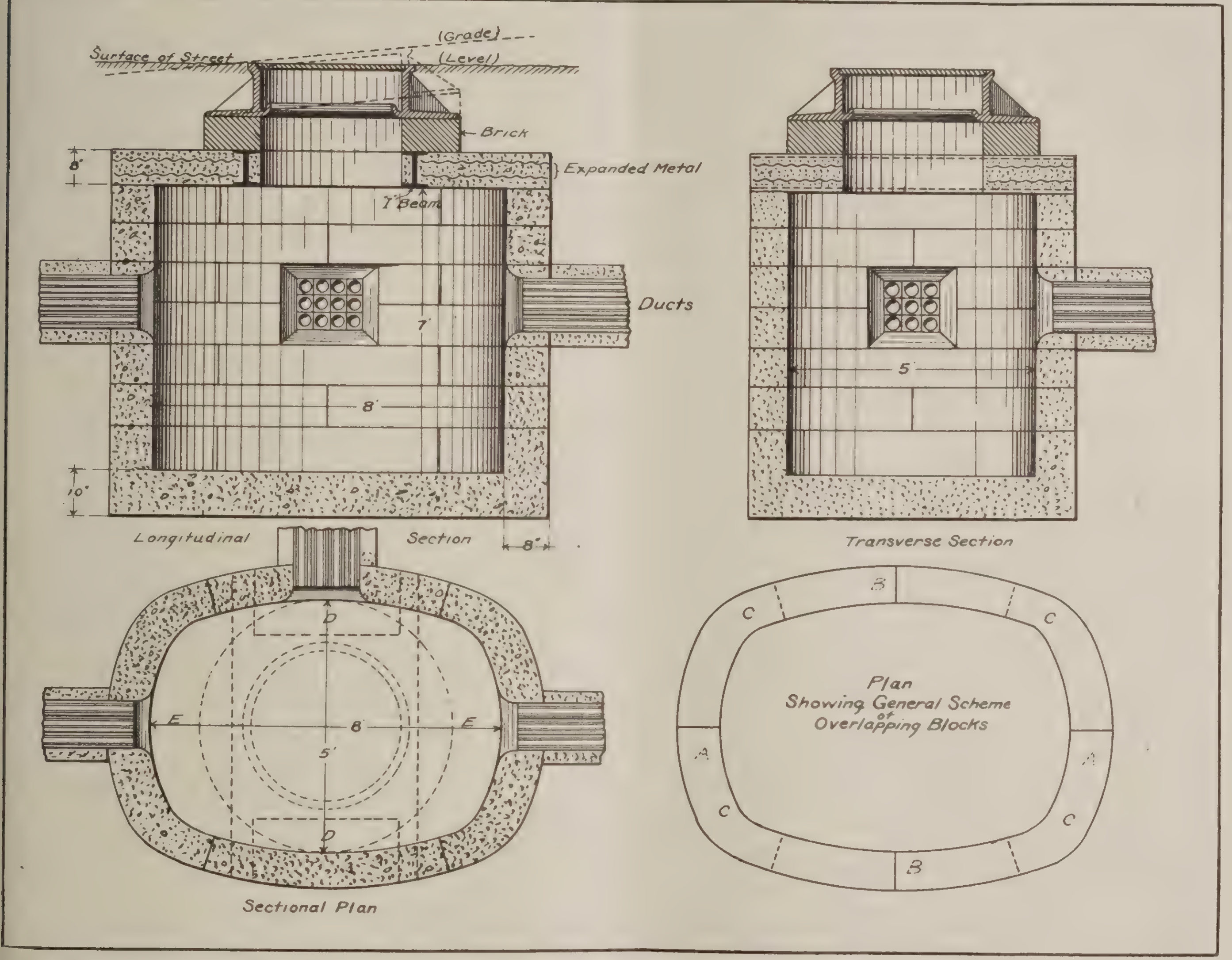


Fig. 1. Vertical Sections of Manhole and Diagrams Showing Arrangement of Blocks.

In constructing the manhole, the base or bottom layer of concrete should be about 10 inches thick. This is placed on the earth in the manhole excavation and well tamped. Cover this concrete base with a ¼-inch layer of concrete and set the pieces *A*, (Fig. 2) and *B* on the ends and sides as shown in the plan drawing, Fig. 1. The joints are well filled with cement. The next course is made up of four pieces shown by *c* in the drawing. The third layer is the same as the first, and the fourth the same as the second, and so on to the top of the manhole, the layers alternating. The whole scheme is indicated in Fig. 1. Obviously in no case is one joint above another. Two eight-inch I beams are now placed across the top of the manhole from side to side as shown in Fig. 1. Two blocks similar to those marked *D* are inserted between the I beams and well cemented. The blocks *E* are next placed, one at each end of the manhole. A four-inch rollock of brick is usually constructed on the top of the manhole to bring the top of the manhole casting flush with the surface of the street. The arrangement is shown in Fig. 1. If the street is level, the brickwork may be dispensed with and cast-iron frame simply set on the I beams. The inside of the manhole should be coated with a good cement mortar mixed in the proportion of one part cement and three parts of good, clean sand. This coating should be a good full quarter of an inch thick. The object of the coating is to make the manhole thoroughly waterproof. At the same time it adds materially to the appearance of its interior. Where the ducts enter the manhole, it is best to omit a block and fill in around the ducts with concrete. The ends of the ducts may be neatly rounded off with mortar when the inside of the manhole is being coated. In the description given very little has been said in regard to the dimensions of the concrete blocks in the completed manhole as all that was aimed for was to give a general idea of the method. The drawings are dimensioned for a standard intermediate or three-way manhole. In view of varying conditions it will be found necessary to alter the dimensions given. The method is very flexible and can be readily adapted to any shape manhole now in use.

IMPEDANCE AND RETARDATION—ARTICLE II

By Arthur Vaughan Abbott.

THERE is another aspect from which the relations of current and the magnetic field may be regarded. Whenever a conductor is so situated that the magnetic field surrounding it is changing, an electromotive force is set up in the conductor. How this takes place is at present a complete mystery, and all that can now be said is that experiment shows such to be the fact. Nearly all of the modern applications of electricity are based upon this. Take for example a dynamo, a pair of powerful magnets are provided, between the poles of which some coils of wire are caused to rotate by means of a steam engine of other motive power. As the wire moves through the magnetic field and passes from where the field is weak to where it is strong an electromotive force is generated in the wire, which manifests itself by causing a current.

The same result could be secured by allowing the wire to stand still and by increasing and decreasing the amount of magnetism which surrounded it. Now, this latter effect is exactly what occurs in the case of a conductor carrying an alternating current. When the current first commences a portion of the electricity is used in creating a magnetic field, and this field as it grows in strength reacts upon the conductor, and sets up therein an electromotive force which opposes and tends to neutralize the electromotive force of the generator which is driving the current.

When the electromotive force supplied by the generator begins to decrease the magnetic field fails, and while it is decreasing, it creates an electromotive force which is added to that of the generator, and tends to prolong the current flow. It is almost self-evident that electromotive force thus generated will be in proportion to the strength of the magnetic field, and to the speed with which the conductor moves. But it is desirable to find some unit with which the magnetic field may be measured. So it has been agreed to call the unit of magnetism such a magnet as can exert a pull of one dyne upon another equal and similar magnet set at a distance of one centimeter. While this scientific definition of the unit of magnetism is technically exact, it does not convey a very distinct idea. For practical purposes it is sufficiently accurate to conceive of the unit magnet as one which could pick up a piece of iron weighing one-tenth of a grain at a distance of about a quarter of an inch.

From the preceding definition the unit magnet will produce a magnetic field every square unit (square centimeter) of which has a unit strength, at a distance of one unit (1 cen.). This unit of magnetic induction, or unit of field is now called the *"maxwell,"* although many writers still adhere to the term *"Line of Force,"* which was the name that Faraday gave to this quantity. So if a magnetic field has a strength a hundred times as great as that produced by a unit magnet, we should say that the intensity of the field was 100 maxwells, or that the field contained 100 lines of force per square centimeter. It is found by experiment that if a conductor be moved in a magnetic field, so that it passes, or as the expression is, *cuts* one hundred million lines of force (or maxwells) in a second of time, an electromotive force of 1 volt will be developed in the conductor, and it is this principle which underlies the design of all dynamo machines and similar pieces of electric apparatus.

Take a telephone receiver, there is a magnet in front of which is placed an iron diaphragm. If one speaks into the receiver the sound waves cause the diaphragm to vibrate, and thus it cuts the imaginary lines of force created by the magnet. As a result an electromotive force is set up in the coils which surround the magnet. This electromotive force will cause currents of electricity to flow, provided a circuit is extended from the binding posts. If this circuit contains a receiver its diaphragm will be set into vibration in a manner exactly similar to that of the original one. Thus in reality the magneto telephone is really nothing but a miniature dynamo machine.

But to return to the question of inductance. When a current is started in a conductor it has been shown that the first operation is to create a magnetic field, and if this magnetic field be formed at such a rate as to cause a hundred million lines of force or maxwells to cut the conductor per second, it is evident that an opposing e. m. f. of one volt will be the result. Now, the number of lines of force cut by the conductor depends upon the geometrical shape of the circuit and the amount of current flowing, and so the unit of *"Inductance,"* which is now called the *"Henry"* and symbolized by the capital letter L is defined to be such an inductance as will produce 1 volt when the current in the circuit changes at the rate of 1 ampere in one second of time.

Consider now what happens in a circuit containing an alternating current dynamo, say an ordinary ringing generator. Turn to Fig. 3, let the circle of which *A* is the centre represent the circumference of the armature and the point *P* any one of the wires with which it is wound. As the armature revolves an electromotive force is generated in the wire, which is alternatively positive and negative. This electromotive force will rise and fall something as shown by the line *M N*. To show this fluctuation requires special apparatus. Fig 4 is a photograph of the electromotive force curve developed by an alternating current generator, obtained by means of an instrument called an oscillograph.

As it requires electromotive force to make a current pass through any conductor, it is evident that when the electromotive force rises and falls the current will correspondingly rise and fall with it, and with every change of current there will be a corresponding pulsation in the magnetic field. This pulsation produces a counter-electromotive force in the conductors which opposes and tends to neutralize a portion of that impressed by the generator. The result of this counter-electromotive force is to *seemingly* increase the opposition of the conductor, so that less current flows than would be expected merely from the resistance which it possesses. This increase in opposition is often called *"Apparent Resistance."*

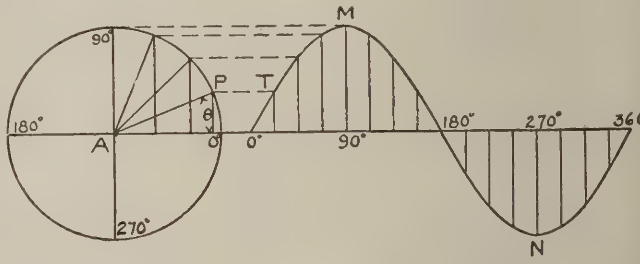


Fig. 3. Alternating Current Diagram.

It is evident from Fig 3 that the faster the armature of the dynamo turns, the more frequent will be the pulsations of current, and the oftener the magnetic field will be reversed. Consequently the reaction of the magnetic field upon the circuit will depend upon the speed at which the generator, furnishing the current, is running. This effect has been termed *"Reactance."* Suppose the armature of the hypothetical dynamo, illustrated in Fig. 3, is 1 ft. in radius and it makes one revolution per second, it is evident that the speed of the armature would be $3.1416 \times 2 \times 1 \times 1 = 6.28$ ft. per second (the radius of the armature, multiplied by the ratio between the circumference and diameter of a circle, multiplied by the number of revolutions per second). This gives us the speed at which the alternations of the current are taking place. If we imagine such a dynamo to be connected to a circuit, whose inductance is 1 unit ($L = 1$ henry). The reactance of the circuit will be $3.1416 \times 2 \times 1 \times 1 \times L = 6.28$ ohms. It is usual to represent the ratio of the radius to the circumference of a circle by the symbol 2π and if N is the number of alternations per second the reactance of any circuit is shown by the expression:

$$\text{Reactance} = 2\pi N L.$$

Reactance has been shown to depend upon the magnetic field which surrounds the circuit. If the conductor is in a straight line it is obvious that it will be surrounded by the fewest possible lines of force; on the contrary, if the conductor is wound into a coil it is apparent that each turn of the coil will be cut by a great many more lines of force than would be the case if it were straight; this is shown diagrammatically in Fig. 5, from which it appears that the outer turn of the coil is cut by two lines, the second turn cut by 3, the third turn by 4, and so on, so that the centre turns are cut by all the lines of force in the entire field.

So far our imaginary circuits have been supposed to have been in air, but we find by experiment that other substances are much more susceptible to magnetism than air. That is to say, with a given magnetizing power, there will be many more lines of force in them than would be in air. For example, iron is what is often termed a good conductor of magnetism, because it seems to be able to multiply enormously the lines of force that would exist in the same space if filled with air. So if we take the coil illustrated in Fig. 5 and insert it into an iron core and surround it with an iron shell, a great many more lines of force would be developed, and consequently the coil would show a very much greater reactance. From what has preceded, it appears that the reactance of any circuit will depend upon three things. *First,* upon the shape in which the circuit is disposed. *Second,* upon the frequency of the alternating current to which it is subjected. *Third,* the magnetic characteristics of the material which surround it. Therefore, to express the reactance of any circuit, the formula given above must be amended and a multiplier introduced which shall recognize the magnetic characteristics of the circuit's environment. The Greek letter μ is usually employed for this purpose, and consequently the formula should read as follows:

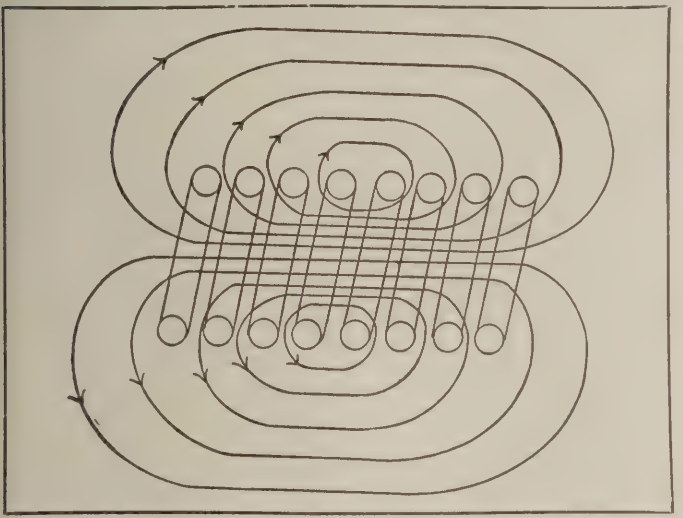


Fig. 5. Lines of Force Cutting a Coil.

$$\text{Reactance} = 2\pi N L \mu.$$

Example: Assume a coil of wire without any core of which the inductance is .025 henrys, to be supplied with an alternating current at a frequency of 100 per second—find reactance. In this case:

$L = .025$ henrys.
$N = 100.$
$2\pi = 6.28.$
$\mu = 1.$
Reactance $= 6.28 \times 100 \times .025 \times 1 = 15.7$ ohms.

The interpretation of this result is that the coil would have an apparent resistance of 15.7 ohms and if it were attached to a generator of the specified frequency, giving 100 volts, such as an ordinary ringing generator, current of 6.37 amperes would flow through the coil.

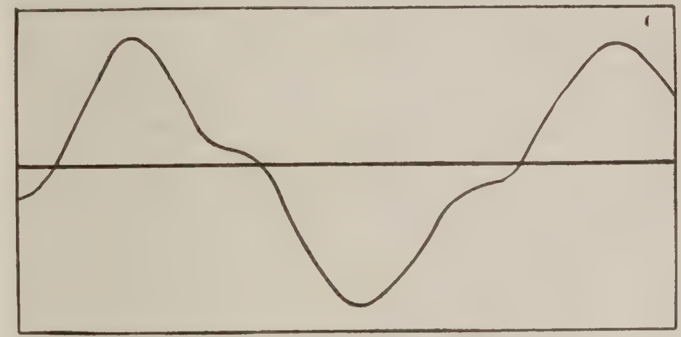


Fig. 4. Oscillogram from a Large Railway Alternator.

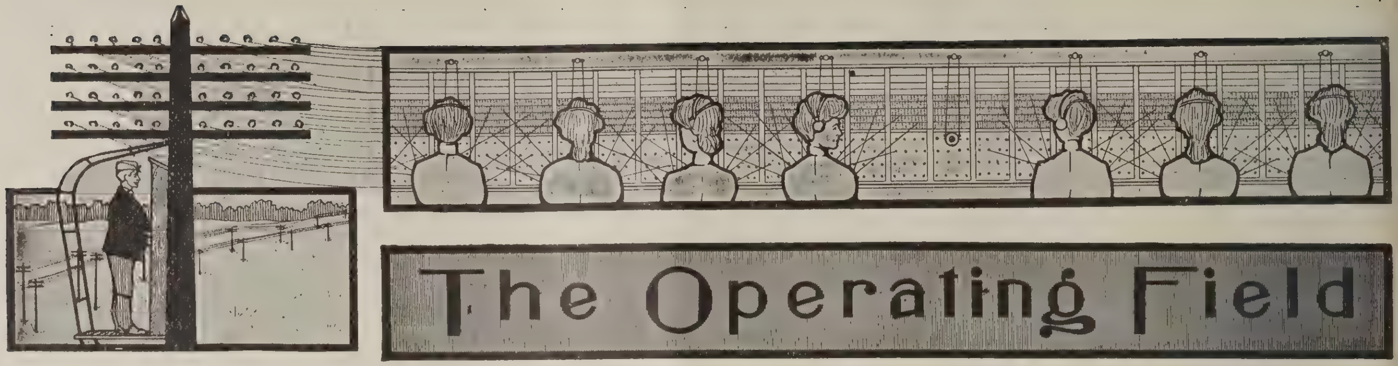
In this example it has been assumed that the coil possessed no resistance in the ordinary sense of the word, but it is evident that no such material exists, so to obtain the opposition which any circuit offers to an alternating current, we must not only consider the *reactance* as calculated by the preceding method, but we must also add thereto the *"resistance"* which the circuit would offer to an ordinary continuous current, and the aggregate of the resistance and the reactance gives the true opposition. This aggregate, however, cannot be found by the ordinary methods of arithmetic, that is, by adding the resistance of the ohms for a continuous current and the ohms found for impedance. On the contrary, it is necessary to adopt a peculiar form of addition which can best be done geometrically. The method will be explained in the next article.

ORANGE AND SUSSEX ASSOCIATION MEETING

A QUARTERLY meeting of the Independent Telephone Association of Orange and Sussex Counties, New York, was held recently in Newburgh. It was organized for the mutual benefit of these companies and those connected with them; to arrange the tolls between the various lines, etc. In this organization each company agrees to abide by the decisions of the other members, and to do all possible for the advancement of the interests of the Independent companies. Social meetings as well as business meetings are held by the association. The officers are: Hon. M. N. Kane, of Warwick, president; Moses Depuy, of Port Jervis, vice-president; W. D. Haggerty, of Sussex County (N. J.), treasurer. Mott Tuthill, of Washingtonville, will probably be elected secretary. The annual meetings of this organization are held in January. The attendance at the quarterly meetings number 18 to 20. Among the members of the association are the following gentlemen: C. H. Tuthill, of Washingtonville; S. H. Sanford, Geo. H. Strong, Dr. F. M. Cummins and George F. Ketchum, of Warwick; P. G. Wagner, of Port Jervis; Charles H. Higham, A. P. Wilbur, John McWilliams and Morris B. Wolf, of Middletown; George G. Otis, of Newburgh; T. F. Lawrence, and George M. Roe, of Chester; W. S. Vanderhoff, C. H. Stanboch, J. N. Miller, Joseph Ayres, and F. E. Armstrong, of Sussex County, and Henry Greenfeldt, of Highland Mills, president of the Highland Telephone Co.

TO ETCH ON STEEL.

TO etch upon steel, warm the article and coat it with white wax or hard tallow. When hard, mark the device through the wax with a sharp-pointed tool; apply nitric acid, and allow it to stand a few minutes; then wash off the acid thoroughly with water, wash the steel, and rub off the wax with a rag.



The Operating Field

INDEPENDENT PROGRESS IN CALIFORNIA.

CONDITIONS are changing very rapidly in the telephone field of Southern California as will be seen by the following: Long distance service from Los Angeles has been opened up with the following places: South Pasadena, Pasadena, Covina, Pomona, Alhambra, El Monte, San Gabriel, Monrovia, Irwindale, Azusa, Glendora, San Dimas, Lordsburg, Clearmont, Ontario, Cucamonga, Compton. Exchanges have been established at Monrovia, 400 lines; Covina, 500 lines; Pomona, 525 lines; Compton, 150 lines; Long Beach, 500 lines, and toll stations at all the others. The following will be in operation about January 1st: Pasadena, 2,000 lines; Hollywood, 150 lines; Whittier, 150 lines. Work is also progressing favorably at the following points, and will soon be completed: San Bernardino, Redlands, Santa Ana, San Pedro, Ventura, Alhambra, Santa Barbara, and Wilmington. Franchises have been applied for at Riverside, San Diego and Santa Monica, and with these the Southern California field will be practically covered.

In Los Angeles, the centre of this large territory, much progress has been made and conditions are changing every day, so that by January 1st it will probably be the largest Independent Exchange in the world. At present there are in actual service 9,589 bona fide telephones, and 8,022 main lines; there are also nearly 6,000 orders lying unfilled, new underground cables, etc., being necessary. There are 38 private branch exchange systems, and 74 special equipments completed and working, and orders for 15 more private branch exchanges unfilled. The branch exchanges run from 10 to 250 lines each, the average being 35 local and three trunk lines each. An addition of 1,080 lines is due to arrive, together with a three-position trunking section and a three-position long distance board, all of which ought to be in full operation by Jan. 1st, 1904. Underground cable to relieve congested districts to the extent of 1,500 lines has just been installed and the connecting up of new lines is now being vigorously pushed. A further capacity of 1,500 more is due to arrive, and will be installed immediately.

The following changes in the organization of the Home Company's force has taken place: Mr. Edward Cook, formerly of the Central Union Tel. Co. (Bell) is superintendent of construction; he was assistant engineer during the construction of the plant. Mr. Fred Hummel, who was cable superintendent during the construction of the plant, has accepted a similar position with the Home Company; he was formerly with the Home Company of Toledo, Ohio.

INDEPENDENT PLANT FOR TORONTO JUNCTION, CANADA.

NEGOTIATIONS have been completed whereby the Humber Power and Light Company, which at present provides the electric light and power service in Toronto Junction, Canada, will be merged into the "Stark" Telephone, Light and Power Company, says *The Canadian Engineer*. The new company has been formed for the purpose of supplying telephone, electric light and power service on the "Stark" system of distribution in Toronto and district. This system enables a telephone, light and power service to be provided on one circuit. A franchise for twenty years has been obtained from the town of Toronto Junction, and the acquisition of the Humber Power and Light Company will enable Mr. Stark to proceed at once with the construction of a telephone system in combination with the existing light and power service.

The agreement with the town provides for the supply of a telephone service within a radius of fifteen miles from the centre of the city of Toronto, at $6 per annum, and one cent per outgoing call, with a maximum charge per annum of $25 for business, and $15 for residence telephones. When, however, the system is in operation in the city of Toronto, with 3,000 subscribers, the maximum charge will be increased to $40 for business and $20 for residence telephones. Three hundred subscribers have already been obtained in Toronto Junction, and the work of construction will be proceeded with at once. The company has also about three thousand contracts signed in Toronto, and arrangements will be made at an early date for the establishment of the system in that city. It is the intention of the company to develop the Humber water-power to an extent which will enable it to supply all the current necessary for a telephone, light and power service in the city and suburbs. The directorate of the new company will include the Hon. John Dryden, president; the Hon. Geo. E. Foster; Mr. J Blacklock (manager of the Reliance Loan and Savings Co.); Mr. H. Waddington (managing director of the London Mutual Insurance Co.); Mr. Gideon Grant (Messrs. Dodds, Grant & Halliday); and the inventor, Mr. Alex. M. Stark, who will be the managing director.

CONCERNING THE PRINCETON, IND., COMPANY.

RECENTLY the stockholders of the Princeton Independent Telephone Company, of Princeton, Ind., met and elected the following directors: Arron Trippett, R. H. Parrett, J. W. Ewing, L. W. Cudgel, V. W. S. Trippett, W. E. Stillwell, and C. F. Stevens. The following officers were chosen: R. H. Parrett, president; J W. Ewing, treasurer, and C. F. Stevens, secretary. The company is now connected with 2,300 telephones in Gibson County, which are divided as follows among the different towns: Francisco, 320; Ft. Branch, 400; Owensville, 420; Haubstadt, 400; Princeton, 550; Sommerville, 100; Mackey, 60, and Buckskin, 40. The company makes a novel offer to farmers. It will furnish a telephone and give connection with all the county for $2.00 per year, the farmers to build lines to the corporation limits of any town with which the company has connection. Exchanges are being installed at Patoka and Hazleton; at the latter place the Home Telephone Company, of Vincennes, Ind., will connect with the Princeton Company.

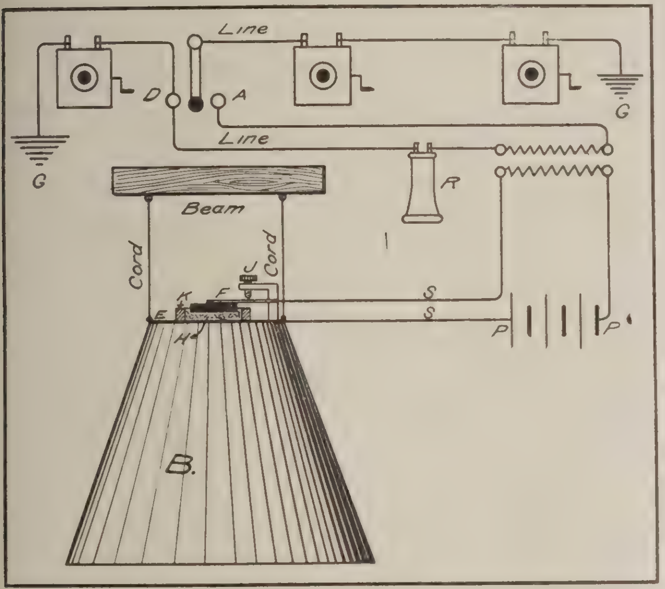
SOUTH PENN. CO. DECLARES ITS FIRST DIVIDEND.

AT a meeting of the board of directors of the South Penn Telephone & Telegraph Company of Waynesburg, Pa., held recently, an initial dividend of 4 per cent. was declared out of the earnings during the past six months. This company has one of the most modern and up-to-date telephone plants in the country, and owing to its location, holds a commanding position in the telephone world. It is thoroughly equipped with the central energy system. Direct trunk lines to Wheeling and Fairmont, W. Va., and to Uniontown, Pa., and connections with their various exchanges, place the company in position to command the telephone business of Waynesburg and Greene county.

TO SEND MUSIC OUT ON THE LINE.

By Charles Claydon.

THE drawing indicates a method that has been used to send music out on a toll line so that all the parties on the line could hear it. The apparatus is crude but has been found to work well and considering the materials from which it was made, has paid for itself many times. The transmitter is shown in section, the rest of the circuit being indicated diagrammatically. It will be noted that the transmitting apparatus is suspended from the ceiling by cords. This is done so that the ordinary vibrations of the room will not effect it and also so that it can be easily moved from place to place. *B* is a tin funnel, 3 inches in diameter at the top and 14 inches in diameter at the bottom. *H* is granular carbon and *F* is a block of carbon attached to a strip of metal which is arranged so that the pressure of the carbon block on the granular carbon can be regulated by the tension screw *J*. The little standard which holds *J* (which can be an ordinary wood screw) is of seasoned wood. *E* is a disk of tin which is the diaphragm on which the granular carbon rests and *K* is a felt ring to confine the carbon to its proper place. The apparatus has been used to send music 50 miles over a party line. The switch *D* is used to cut the transmitter into the line or to cut the line straight through as is desired. The tension screw *J* should be adjusted until the listening party says he can hear best.



MUNICIPAL TELEPHONY IN CANADA.

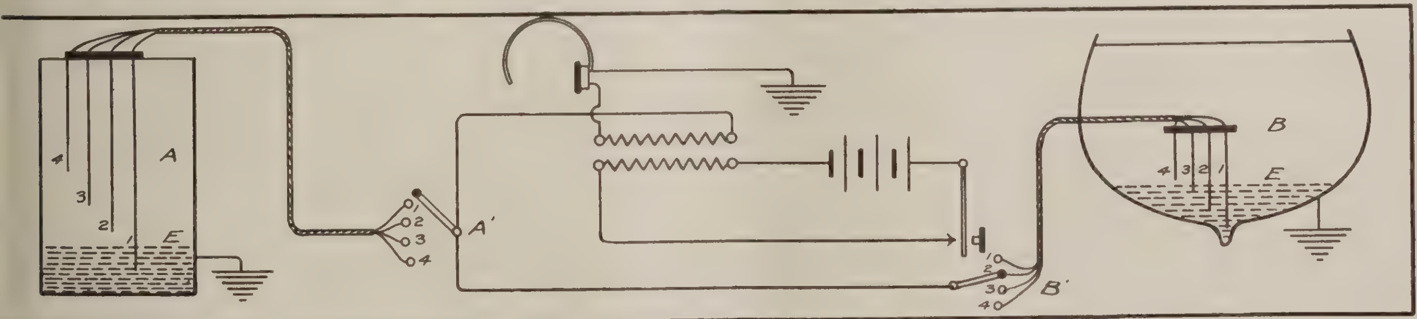
UP to the 1st of September the municipal telephone system of Fort William, Canada, had in operation 90 business telephones, at $24 a year each, and 210 residential telephones at $12 a year, and if further increases take place the switchboard will have to be enlarged, says the *Canadian Engineer*. The Bell Company charged $30 for business telephones and $25 for residences, and had 110 telephones when the municipal system was established. Although the Bell company gives free service in some cases, the people are standing well by their own system, and it is calculated that, even with the present cheap rates, the new system will yield a small profit to the town.

DIRECTORY SUPPLEMENT FOR DANE COUNTY CO.

A SUPPLEMENTAL list of subscribers added since May 1st, when the last main directory was published, has been issued by the Dane County Telephone Company, of Wisconsin. The new book contains 400 names and shows a very substantial increase in subscribers during the past five months. The demand for telephones seems to be without end and the company hopes to have 2,000 subscribers before the end of the year; and at the present rate of increase this will be easily accomplished.

TELEPHONIC FLUID LEVEL INDICATOR

A LONDON inventor has designed a water level indicator which is shown diagrammatically in the figure. *A* is a tank in which a number of insulated conductors, *1*, *2*, *3* and *4* are placed as shown, each one being of a different length. The ends of each of the conductors are left bare. The conductors are made up into a cable and carried to a switch *A'*, which is located at any convenient point at which it is desired to ascertain the height of the fluid in the tank. An induction coil and receiver are connected in circuit as shown. In series with the battery and the primary of the induction coil, is a circuit breaking device so that a continuous noise may be maintained in the receiver. If the switch *A'* be placed successively upon one point after the other of the contacts, the sound of the vibrating receiver diaphragm can be heard in the telephone so long as the receiver circuit is completed by a contact of the liquid in the tank with the exposed point of one of the conductors. By multiplying the number of conductors it is evident that measurements of any degree of accuracy can be secured. The inventor claims that his invention is specially applicable on shipboard, where it is required to record the amount of water in the ballast tanks, bilges, etc. An officer on watch can readily ascertain the depth of the water in the various tanks. The testing arrangements for all the tanks could be grouped together at a convenient spot, and in this way much more reliable information can be obtained than is the case at present, when the ship's carpenter has to gauge approximately the water in the tanks. In the drawing one cable is shown going to a tank and the other to the bilge. The article does not state why the telephonic apparatus is preferred.



The Editor's Page

IF THERE WERE NO INDEPENDENTS. WE WOULD BE MANY YEARS BEHIND.

WHEN a true history of the social development of the past decade comes to be written, the telephone will loom into exceptional prominence among the great dynamic forces. The closing years of the last century witnessed a wonderful growth in telephony, which has increased by leaps and bounds during the past three years. But even now the telephone movement is in its infancy, and, standing as we do on the threshold of a great era, the possibilities along the line of telephone construction almost overwhelm the mind.

The enormous extension of telephone service into country districts is one of the most significant signs of the time. The rural telephone, the free rural mail delivery and the interurban electric railway are three great forces now at work solving the problems of country life and country isolation. Add to these a fourth, of equal importance but as yet not so much in evidence, and often unappreciated, a central graded school with transportation for the children, and the last excuse among the farmers for moving to town will disappear. The noble occupation of agriculture will be raised to greater dignity and there no longer will be the same trouble in keeping the children on the farm.

It is difficult to look very far into the future, and possibly the original promoters and exploiters of telephony, the American Bell company, should not be blamed too harshly for the shortsighted policy which they at first adopted. Yet, from a study of the situation the conclusion becomes irresistible, that had the Bell monopoly remained in undisputed possession of the field, the development of telephony would have been set back twenty five years.

The enormous expansion in the telephone business dates from the expiration of certain patents and the advent of the Independent operator in the field. Especially is this true of the telephone in rural communities. It seems never to have entered the heads of those eastern capitalists who control the Bell interests that the farmer needed a telephone. It remained for the Independent operator to blaze the way and demonstrate the value of rural lines and exchanges. As a matter of fact, for manifest reasons, the farmer needs a telephone even more than does his city brother. Even the Bell companies now appreciate this, and in many rural districts three-fourths of the farm houses are on speaking terms with each other, through the mediumship of either the Independent or the Bell company.

But while it is sometimes impossible to see far ahead, to read the handwriting on the wall ought not to be so difficult. The marvel is still unexplained why the Bell company has permitted these Independent systems to become competitive to such a degree that loss of prestige, decrease of stock values and even bankruptcy in some cases has resulted.

The survival of the fittest is not always the survival of the strongest in the popular conception of the word, and if an Independent telephone company has successfully invaded the territory of the Bell interests, there is some good reason for it beyond sheer brute strength. People will not put up with the inconvenience and expense of two competing telephones or will not discard the old for the new unless there are some great compensatory features.

In a town of thirty thousand people, not far from Chicago, a few years ago the Bell company had undisputed possession of the field with an exchange of five hundred telephones. It was not progressive and was giving poor service when an Independent company entered the territory. The new company was not welcomed with any great cordiality by the people and the business men were not slow in expressing their belief that two telephones would be a nuisance. Yet, in spite of this and in spite of the sand bag methods promptly adopted by the Bell people, instead of one system with five hundred subscribers, giving execrable service, each of the two systems has some fifteen hundred subscribers, the service has been greatly improved, telephone rentals have been cut in two, and it is now possible to telephone to any part of the county at a flat rate of five cents. The Independent company has made money from the start and is paying five per cent. on its bonds and four per cent. on its common stock. All this, notwithstanding the fact that the Independent company has no line to Chicago, and has only one-half its equipment in active earning service. This is a fair sample of what the Independent telephone movement is doing and can do for the country and for investors.

In Springfield, the capital of Illinois, an Independent company commenced business a few weeks ago and already has one thousand telephones in service, with the people clamoring for them faster than they can be installed. They swear by the new company and swear at the old. The service given by the Bell company is universally condemned and can not be greatly improved without the expenditure of thousands of dollars in rebuilding the system. But in Springfield, as in all other places where an Independent system has come into direct competition with an established Bell company, the latter adopted reprehensible sand bag methods to stifle competition, instead of making competition unnecessary and undesirable by the excellence of its own service.

All these facts are interesting because significant. The future of telephony is tremendous to contemplate, and the Independent operator by hewing to the line he has marked out for himself so successfully, by keeping close to the people and developing his business scientifically and economically, will have a large share in this future. Surely, it is absurd to suppose that he will voluntarily relinquish all this and put his head into the lion's mouth because the lion, although owned body and soul by the Bell interests, retains the old name of Kellogg, and masquerades as an Independent concern. In the next few years the Independent operators will purchase an immense amount of telephone equipment. To place these orders with a Bell adjunct, under whatever name or disguise it may be operating, would be to cripple their own strength and handicap their own future.

CONTEMPORARY CROSS-TALK

By "The Listening Key."

WE were discussing in our last batch of notes, just when space ran short, the importance of maintaining the simple and practically automatic method of operating the service from the subscribers' stations. This point gains added force when it is considered that modern ideas of telephone development entail the extension of the service to a far wider circle of users than was formerly thought possible or even probable. Not that old subscribers and expert users of the service do not appreciate the simplicity and celerity of the modern form of service. Of course they do, and they would highly resent going back to methods that involved more manual operations on their part or a greater tax on the memory. But with the large classes of small users that modern rates and modern enterprise are tapping, it is absolutely necessary to have a simple and direct method of using the telephone, in order to put it beyond the reach of the careless, the ignorant and the unintelligent part of the public to impose a drag on the service by inefficient or slovenly operation of the public end of the system. We have established a standard of rapid service and we must put it out of the power of the public to debase that standard.

Little Grains of Sand

IT is the old story of the mighty influence of small details many times repeated. One talks of "telephone service" in the abstract and the expression has a vague and general meaning. But when one analyzes "telephone service" and finds that it means tens of thousands and hundreds of thousands of operations every day, and that each one of those operations requires several distinct steps to be performed promptly and accurately by three and often four people, one sees how important it is that each of the steps to be performed be made as simple and as straightforward as possible. If not, we are piling up at every moment "little grains of sand" that will make a mountain of work in the twenty-four hours; and someone has to pay for the time and labor expended on that mountain, made up of little grains of needless work and unnecessary waste of time. A few seconds wasted on each call by doing unnecessary work mount up most prodigiously when you are dealing with thousands of calls an hour. If you give the subscriber the chance to waste any time at all by requiring him to perform special acts in the operation of the service, there are many subscribers who will improve the opportunity to waste a great deal of time by doing those things which they ought not to do or forgetting to do those which they ought to do.

Subscribers are Subscribers

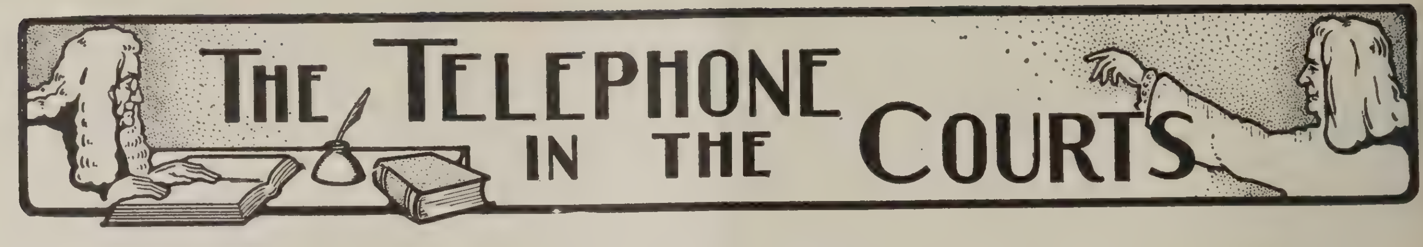
IT must always be remembered that telephone subscribers are telephone subscribers only in name. Some particular person or firm pays for the telephone service supplied at any given address, but everybody uses it. At one moment it may be the president of a bank, who is the caller, and at another the newest office boy, fresh from the slums. Now, the president of a bank is not a much better hand at doing a series of mechanical movements that impose a tax on the memory that the office boy is, and both will do them wrong or forget some essential act, if you give them half a chance. Similarly, in thousands of business establishments, while there may be only one name in the telephone directory, the telephone may be used daily by any one of five, ten or a hundred different persons. In private residences the telephone is used not only by the mistress of the house, but often by her giddy daughters and slapdash sons, and quite frequently too by the cook and the housemaid. Among the many "small users" to whom the telephone service is now reaching out, are artisans and tradesmen of all classes, excellent hands at their own trades but not quick to pick up another. When we talk of "subscribers," then, we really mean a very large and much-assorted section of the general public.

Not Experts

CONSEQUENTLY it is wholly unpractical to regard the "subscribers" as a body of trained experts, who may be charged with performing invariably well a series of operations involving, for their accurate and successful performance, a certain tax on the attention, the memory and the power of selection. If you look on your system of ten thousand telephones as being operated every day by the same ten thousand people, you take a wholly erroneous point of view. You should rather make up your mind that the operations are really done by approximately one hundred thousand people, of both sexes, all ages and widely varying degrees of intelligence and sense of responsibility. From that point of view, which is the one more in accordance with the real facts, it is clear that it is wrong to place any but the simplest apparatus, requiring the simplest possible method of operation, at the public end of the system. This is where such a system as the divided multiple board, advocated by Mr. Aitken, would go wrong. The operating of that system would depend on the correct selection at every call of one out of two or three buttons on the instrument. If we grant that in a system of ten thousand stations a hundred thousand people may be implicated in the day's traffic, it would not be extravagant to predict that at least one out of every five would do the wrong thing, which would give twenty thousand false calls at least.

Operators are the Experts

THIS view of the subject, and a consideration of the results that twenty thousand wrong calls a day would lead to, are quite enough to make us ponder long and carefully before adopting any form of apparatus demanding an expert "subscriber" for its successful working. And it is such considerations as these that have led us to abandon, one after another, all methods of working that involved specific acts on the part of the public which the public might perform inefficiently or not perform at all. The real experts in the operation of the system are the operators. Them, we can instruct, train and supervise; we can make them experts and keep them experts, and we can provide them with every refinement that with expert use will promote rapid and accurate operation. On them and on our own inventiveness and powers of origination must we rely for the real working of the system. The *using* of the system we must make as easy and simple as possible, and the using we must differentiate clearly from the working. At present, the using of the system is done by the simple act of moving the receiver. Some day we may improve even upon that. It has been shown that the Selenium cell has now been brought to such a perfection of sensitiveness that the mere holding of the hand in front of it will produce a change sufficient to set a signal, start a motor or fire a gun at the end of the circuit. Similarly, we may be able one day, to call the attention of "central" by an equally simple movement. It could be done to-day for that matter. But probably the day will come when the receiver will be kept fixed and by simply saying "Hi!" to the transmitter we shall call forth instantly the cheery "Number, please?" of the alert central operator.



THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

QUESTIONS IN TELEPHONE CONSTRUCTION.

WHAT distance must a telephone wire be above the rails in passing over a railroad in Iowa?

2. About what distance above the road would you judge a telephone wire must be to make an Iowa threshing machine owner responsible for breaking wires?

3. About what distance away, where there is nothing to prevent, could you compel an electric light current of 110 volts to keep from telephone lines both in passing and paralleling lines? W. H. B.

THE telephone wires must be suspended so as not to interfere with the operation of the railroad. They should be strung at such a height as to permit the passage of trains underneath and not to endanger lives of employees on such trains. Railway Co. v. European Electric Printing Telegraph Co., 9 Exch. 363, Allen's Teleg. Cas. 8. The railroad company has the right to pass a train of cars underneath with a brakeman or other employee standing upon the roof, and may require the wires to be so high that they will not touch the train nor the man standing erect on top of the cars. Southwestern Telegraph & Telephone Co., 27 S. W. 38. This is true of the passage of cars of ordinary height; the telephone company cannot be required to string its wires at such a height as to permit the passage of unusually high cars with men on top of them. Gross v. Southern Chicago City Ry. Co., 73 Ill. App. 217. What the actual distance should be, we cannot determine without having given the ordinary height of engines and cars upon the particular railroad. See also Joyce on Electric Law, sec. 419.

2. The passage of Threshing machines along the roads of Iowa is among the uses for which the roads were intended. The telephone wire should therefore be at such a height above the road as to permit a threshing machine in its ordinary traveling trim to pass under. If it is suspended at such a height, and the owner of a threshing machine breaks the wire, he is liable in damages. Even if the wire were not high enough to allow the moving of the machine underneath, and the owner broke the wire when he might have passed under without doing so, as for instance by pushing the wire up out of the way, he would be liable for all unnecessary damage to the wire. Here, again, we cannot give figures without knowing the height of Iowa threshing machines in travelling trim.

3. In a Missouri case, the Supreme Court sustained the action of the St. Louis Circuit Court in granting an injunction restraining the transmission of any electric currents through wires strung below those of the plaintiff telephone company, or the stringing of any more wires in that position; and from suspending any wires above those of the plaintiff, *nearer than three feet* and ordering guards for the electric light company's wires. Western Union Telegraph Co. v. Guernsey & Scudder E. L. Co., 46 Mo. App. 120; 3 Am. Elec. Cas. 425. In a Texas case an injunction was granted restraining an electric light company from stringing its wires *nearer than four feet* from the telephone company's wires. Paris Electric Light & Ry. Co. v. Southwestern Telegraph & Telephone Co., 5 Am. Elec. Cas. 262. If the telephone company had prior authority to occupy, and did so first occupy, the streets, an electrical company subsequently licensed is under the duty to so maintain its wires and lines as not to interfere with the right of the prior occupant of the streets to properly maintain and operate its lines and to transact the business it is authorized by its franchise to transact. Jones on Electric Law, sec. 517.

GRANT HELD NOT BINDING.

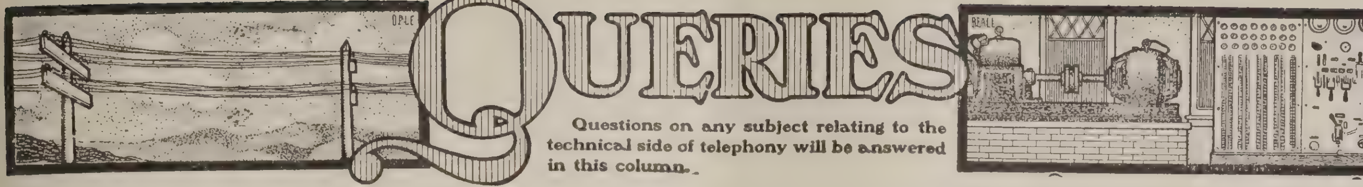
THE Court of Appeals of New York has held that a grant of a right of way to set poles on a farmer's land, the signature to which, though genuine, was obtained by fraud, has no more force and effect than a forgery. This decision was rendered in the case of Wilcox v. American Telephone & Telegraph Company, in which the decision of the trial court for the defendant was reversed. The case was an action of ejectment, the plaintiff averring that the defendant had no right to maintain its poles on his land. The defendant set up as a defense, and introduced on the trial, a grant of easement signed by plaintiff. The plaintiff admitted that the signature to this instrument was genuine, but testified that when he signed the instrument he supposed it was a receipt for $1; that defendant's agent represented to him that the defendant's men had been trimming an apple tree on his premises and wanted to pay him $1, and asked him to sign the instrument in question, saying it was merely a receipt. The trial court dismissed the plaintiff's complaint on the ground that the plaintiff should be bound by the instrument signed by him even though he did not understand its contents and supposed it was a mere receipt. The Court of Appeals did not concur in this view of the matter, but held that the plaintiff was not bound by the instrument if he was mislead into signing it Wilcox v. American Telephone & Telegraph Co., 68 N. E. 153.

TAXATION OF REALTY IN NEW HAMPSHIRE.

THE statutes of New Hampshire provide a specific system of taxation for telephone companies. The basis of the tax is the value of the lines within the State. The assessment is made by the State Board of Equalization. Telephone companies are to be taxed only in the mode prescribed, but real estate not used in the ordinary conduct of the business is exempted from taxation in this way and is taxed in the town in which it is situated. In a recent suit by the New England Telephone & Telegraph Company to recover from the city of Manchester certain taxes paid by the company under protest upon a new exchange building and real estate situated in that city, the question was raised whether the realty in question was used in the ordinary course of business and was to be taxed by the State Board of Equalization or was not used in the ordinary course of business and was subject to taxation by the local authorities. The court held it to be used in the ordinary course of business and taxable under the State Board's jurisdiction. New England Telephone & Telegraph Co. v. City of Manchester, 55 A. 188.

AN ACCOMMODATING CRIMINAL.

TIRED of dodging every man that his terrified imagination warned him might be an officer in disguise, disgusted with sleeping in barn lofts and cellars, and hungry for a square meal, James Edgey, escaped prisoner from the workhouse at Indianapolis, bethought himself of the telephone, and calling up the superintendent said that if the patrol wagon were sent after him he would give himself up.



Questions on any subject relating to the technical side of telephony will be answered in this column.

SOME QUESTIONS ABOUT BELLS.—(231.)

No. 1. Assume a telephone line from *A* to *B* (Fig. 231a) five miles; from *B* to *C* one mile; at *A* there are dry batteries and a pole changer; between *B* and *C* there are ten telephones with thousand ohm bridge bells and 80 ohms series bells; how many batteries will it take to ring the bells?

No. 2. Suppose the batteries are placed at *A*, and the pole changer at *B* with the bells as before; how many batteries are required to ring the bells?

No. 3. Why is A. C. current used for ringing telephone lines?

No. 4. Why not use D. C. current for ringing?

No. 5. In a four-party selective ringing system what kind of current is used for ringing, and what is the difference in the construction of the bells?

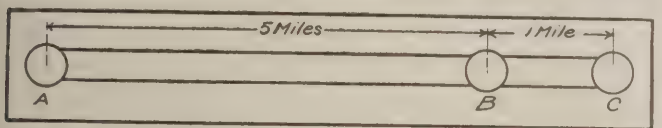


Fig. 231a.

No. 6. If a D. C. bell would ring with as small a current as the present A. C. bells would there be any objection to using it?

No. 7. Can there be a magnet for A. C. current so constructed that it will attract an armature when the current is sent through it in one direction, and repel it when sent in another direction? D. V. O.

No. 1.—The ordinary telephone ringer, whether series or bridged, is built to operate on from 80 to 100 volts. To make your bells ring successfully, about the same voltage must be applied to the line as would be developed by the ordinary ringing generator, and the number of dry cells required will depend on the voltage of the cell, as some cells give greater voltage than others. The average dry cell varies from 1¼ to 1¾ volts, and to produce 100 volts will require from 60 to 80 cells.

No. 2.—So far as ringing the bells is concerned, it makes practically no difference where upon the line the pole changer is placed.

Nos. 3, 4 and 6.—An alternating current is used for signalling upon telephone lines because the alternating current can be produced by a hand generator instead of battery, and because the alternating current bell has no contacts,, whereas the direct current bell must be provided with a means for breaking the circuit. The circuit-breaker on the bell is likely to get out of order, and spark and corrode, and is therefore more expensive to maintain and likely to give the subscriber and the telephonist more trouble than the alternating apparatus.

No. 5.—The four-party selective signal system, to which we suppose you refer, is one in which the circuit is arranged to ring ground and talk metallic. Two bells are legged off at each side of the line to ground, as shown in Fig. 231b, and each of these is what is called a polarized bell; that is to say, the bell armature is supplied with an adjustable spring, so that it may be given a slight set, either towards the positive or negative side of the magnet. The current, which is used to ring the bells, is not an alternating current, but a pulsating current. A pulsating current differs from an alternating current. The alternating current is a wave of equal intensity on each side of the zero line of voltage. The pulsating current is a series of impulses, all of which are either positive or all negative. The forms of waves of alternating and pulsating current are shown in Figs. 231c and 231b. By sending a positive pulsating current over one side of the line, the bell on that side of the line that is adjusted to respond to a positive pulsation current will ring. The other side receives no current. Consequently its bell will not ring. The other bell on the side of the line which is being rung on does not ring because it is adjusted to respond to a negative pulsating current. By ringing in a similar manner upon the other side of the line with either a positive or a negative current, the corresponding bell on that side is caused to respond.

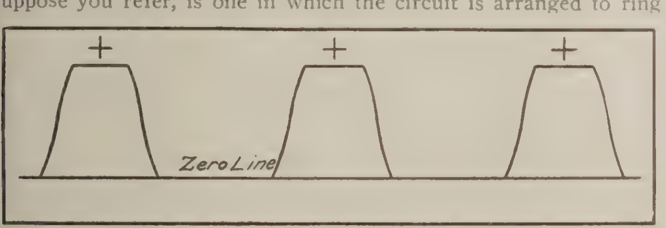


Fig. 231c.

No. 7.—We know of no magnet that is arranged as you describe. We think it probable that you may have in mind a magnet for a pulsating current which can be made to respond in the way you indicate.

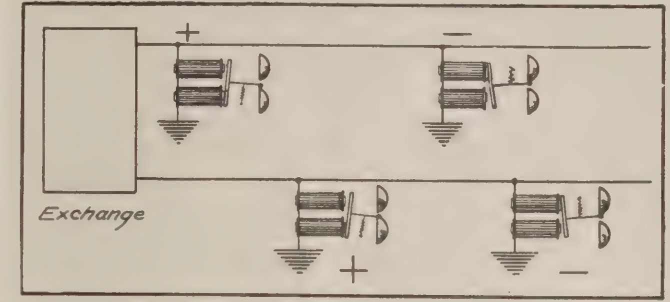


Fig. 231b.

WHY NO LOUD SPEAKING TELEPHONES.—(232.)

I have heard that transmitters and receivers are made, called loud-speaking telephones, by means of which the receiver repeats in so loud a tone as to be audible over a large room. Why are not such instruments in more common use? P. O. E.

The so-called loud-speaking telephone apparatus is much more common in Europe than in this country. There are two reasons for its infrequent employment. First, the amount of current required to operate such apparatus is so great that with telephone cables as now made, there is a strong probability of objectionable cross-talk. Second, there is little or no demand for apparatus of this kind excepting for purposes of exhibition. On the contrary, one salient and desirable feature of telephonic apparatus as now built, is its ability to be largely secret. For example, a business man in his office hears the telephone signal, and places the receiver to his ear and answers the inquiry of his correspondent. In all probability, other parties are in the office at the same time, and it may be exceedingly undesirable that they should be able to understand the message which is being transmitted. While they can hear the answers spoken into the transmitter, it is only by inference that the nature of the communication can be understood. If the loud-speaking receiver were employed, the whole conversation would be audible to all parties. This is probably the chief reason why loud-speaking telephones are not popular in this country.

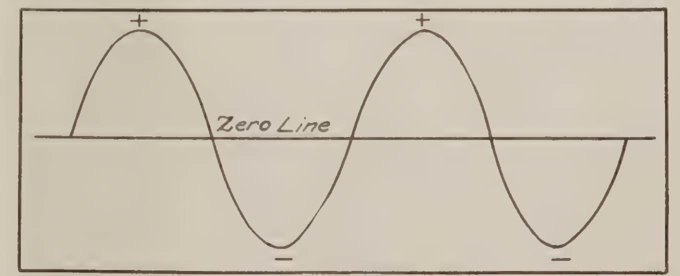


Fig. 231d.

NEW-YORK-CHICAGO TOLL LINES.—(233.)

Can you tell me what size wire is used on the toll lines from New York to Chicago, and how many circuits are available? N. A. H.

According to the best information obtainable the wire used on the New York-Chicago line is No. 8 B. W. G. hand drawn copper. There are probably about 50 working lines between the two cities.

PATENTS ISSUED

PROTECTIVE DEVICE.

Adolph C. Gilger, of St. Louis, patents (No. 742,626) and assigns to the Central Telephone & Electric Company, of St. Louis, an improved protective device. This invention is illustrated in Figs. 2, 3a and 3b. Fig. 2 shows a cable head with a cable connected to terminals in the usual manner. On the outside of the head a series of clips are arranged for holding the protector, shown at *6*. The protector, as indicated in Fig. 3, consists of an insulating material *14*, set in conducting heads, *10* and *9*. This insulating material is covered with a fine wire wound spirally around it as illustrated. When used upon the cable head this protector is placed close to the iron of the head, and therefore, in the event of a lightning discharge the impedance of the fuse wire is sufficient to cause the discharge to split off to the cable head and to ground.

Fig. 2

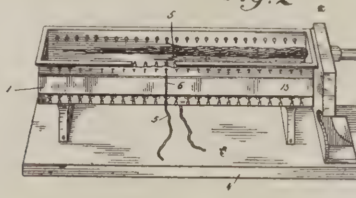


Fig. 3^a

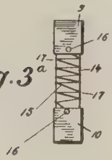
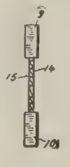
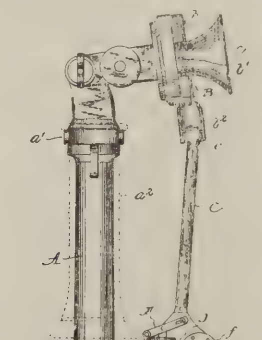


Fig. 3^b



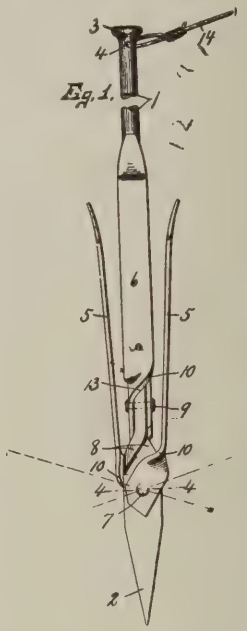
DEVICE FOR DISINFECTING TELEPHONES.

Nelson J. Tubbs, of Louisville, Ky., patents (No. 743,353) and assigns one-half to R. H. Smith and I. S. Hartley, of Louisville, Ky., an improvement in disinfecting telephones. The object of this invention is to provide an improved method of disinfecting the mouth and ear pieces of telephonic apparatus, and to remove therefrom any possible germs that may have collected. The invention is shown in the figure. The essence of this device consists in surrounding the transmitter or receiver with a chamber *B* which communicates by means of the pipe *C* with a mechanism which is enclosed in a case *D*. In this chamber there is a gas jet *E*, and the inventor proposes that when the arm *C* is raised and lowered the gas jet is automatically opened and closed. At the same time, he furnishes a roll of percussion caps so arranged that the raising and lowering of the arm ignites and sets fire to the gas jet. The gas jet heats the air enclosed in the casing *D* which flows around the mouth piece of the transmitter or receiver as the case may be. By heating the air sufficiently, the inventor proposes to kill all germs.



GUY ANCHOR.

Aaron Bearse, of Syracuse, N. Y., patents (No. 742,279) an improved ground anchor. This invention is shown in the figure, the object being to provide a device which shall obviate the necessity of making an excavation for anchoring guys of all descriptions. A heavy iron or steel bar *6* is provided that is sharpened as shown at *2*. At the point, *4*, a pair of ears *5 5* are pivoted. The guy is attached to a hole *4* in the top of the bar. The operation of the device is as follows: The bar may be driven in the ground by a sledge or maul. As it passes downwards the ears *5 5* are closed against its sides. As soon as the strain of the guys is completed the rod *6* tends to pull out of the ground. The ears catch and open, thus anchoring it firmly.



CONCERNING GROUND WIRES.

M. GUARINI, of France, in the course of a controversy on the efficiency of ground wires for telegraph and telephone circuits, as a factor in eliminating foreign currents, writes to the *London Electrician*, that disturbances to the telegraphic and telephonic systems can be avoided—only in the case of alternating-power currents, however—by placing their ground wires at a great depth. When continuous-power currents are employed, M. Guarini proposes to use two-power circuits carrying equal currents, the positive side being earthed in one case and the negative in the other; in fact, practically a three-wire system with an earth return instead of a neutral wire—an idea which is hardly novel.

HUMANITY IS LEFT EARED.

THE great mass of humanity is right-handed. Manufacturers of telephones take their cue from this fact, inasmuch as all the instruments in use have the receiver adjusted for the left ear and the left hand, leaving the right hand free to use pen or pencil for jotting down points of a message. Once in a while you will see a right-handed, right-eared man who has trouble in handling the left-eared instrument.

ABOUT TELEPHONES IN EUROPE*

By J. F. Hemenway.

STOCKHOLM is sometimes called the best telephoned city in the world because of the large number of telephones in use as compared with the number of inhabitants. At the present time, there is about one telephone to eight people, or 40,000 instruments and 300,000 inhabitants. Telephones have been made in Sweden since the early days of the industry, and because the patents restricted their manufacture here, the Swedish make has found its way to every known country of the globe. In Sweden and Norway the long distance telephone lines are owned by the government, which also controls the railroads and telegraph. In Stockholm and immediate vicinity, the older company, called the Almanna or General Telephone Company, is still in existence and has, by far, the largest number of telephones in use in its own field. The Riks, or Government telephone system, operates the long distance lines from Stockholm throughout Sweden and Norway, and also the exchanges in all other cities; but in Stockholm and vicinity it has very many less instruments in use than the Almanna.

In some of the other countries in Europe, notably Germany and France, the exchanges and long distance lines are entirely in the hands of the government, and only the telephones made in each country can be sold for use in that country; as a result, some of the telephones appear very strange to the foreigner; for instance in Germany, the instruments are about the same size as the ordinary telephones, and with the ordinary transmitter, but the receivers are of an enormous size, nearly as large as saucers and fully covering the ear. They are much heavier than our receivers, weighing two or three times as much, and each telephone has two receivers. Service in Germany is very bad, as can be imagined when two receivers are supplied for each telephone, which, in this country, would be considered entirely unnecessary. In order to be understood, one has frequently to shout and even then it is with difficulty that the conversation is carried on, especially at a distance. It is not uncommon in the smaller places to have the advice given you: "Take a cab, as it will save time and be so much more satisfactory than telephoning."

In France, a foreigner, in using the telephone, is very apt to wonder where the transmitter is and to look about for it. The telephone box is made very much like our ordinary instrument and has a small wooden shelf, such as we use for a paper pad, on which to make a note of the conversation. Strangers sometimes suppose that the shelf is for such a purpose, but strange to say, it forms the diaphragm of the transmitter, and in talking, one talks right against the wooden shelf. Notwithstanding this peculiarity, the telephones in France give very fair service and have only one receiver.

In St. Petersburg, Russia, the installation is not metallic circuit. The service is very bad. When the old system was taken over from the Bell company, there were 4,500 subscribers, and owing to the reduced rates, there has been a large demand for connections from new subscribers. The outside construction is good, and it is proposed to install a new system with all the wires underground, and full metallic circuit for each subscriber, no party lines being allowed, as this is called for in the franchise. This new underground system must be completed in 1905, and it is intended to build for 40,000 subscribers' capacity, and to have the latest improved common battery system. The government has built two copper circuit trunk lines between Moscow and St. Petersburg, which are operated by the St. Petersburg municipality, giving connections with Moscow, at the very reasonable charge of 25 cents for three minutes' conversation. The peculiar character of the service in all Russian towns is, that it is impossible to give private service or to guarantee secrecy, as the police officials may listen at all times and to any conversation, and may use what they hear against the user of the telephone. Also, if they choose, they can, at any time, order the service to any subscriber discontinued.

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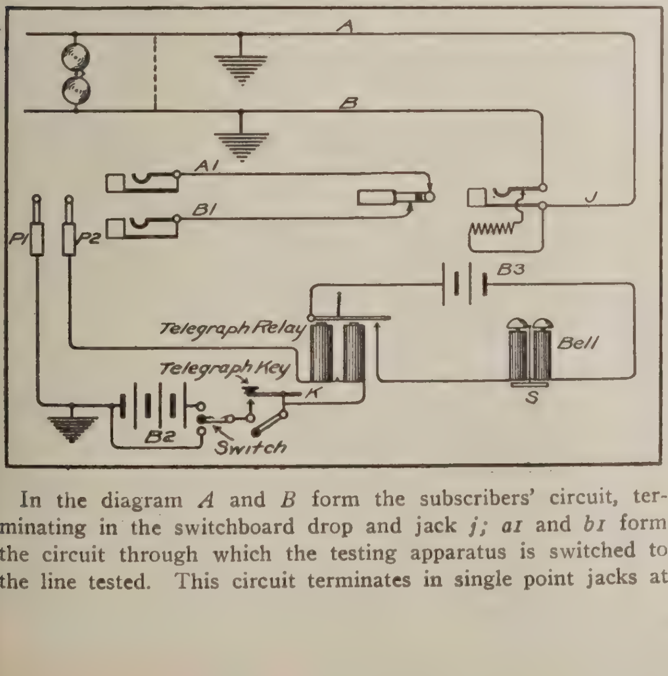
* Abstract from a paper read before the convention of the League of American Municipalities at Baltimore.

A TEST CIRCUIT APPLIANCE

By C. H. Coar.

TELEPHONE lines afflicted with intermittent trouble are very discouraging to both the wire chief and subscribers, as these lines seem invariably to be in good order when tested. The following circuit will prove a help in locating such trouble as swinging grounds, short circuits, or telegraph crosses.



In the diagram A and B form the subscribers' circuit, terminating in the switchboard drop and jack j; $a1$ and $b1$ form the circuit through which the testing apparatus is switched to the line tested. This circuit terminates in single point jacks at the test set and a metallic plug located at the switchboard forms the other terminal. The apparatus consists of a regular 250 ohm telegraph relay R; k, telegraph key; s, a vibrating bell or telegraph sounder; $s1$, a two-point switch; $b2$, an open circuit relay battery of 20 volts; $b3$, a local or sounder battery of 4 volts, and $p1$ and $p2$, single point plugs adapted to fit jacks $a1$ and $b1$.

To test a line for a ground or telegraph cross, place line on test set circuit; each side may be tested by plugging $k2$ in $a1$ or $b1$ jacks. In case of a telegraph cross the relay battery $b2$ can be cut out by the switch $s1$, leaving the relay in condition to be operated by the telegraph current itself.

To test for a short circuit, place plugs $p1$ and $p2$ in jacks $a1$ and $b1$; a ground will also operate the relay in this test. The trouble will make itself known by operating the relay, which in turn closes the local bell or sounder circuit. The object of this circuit when applied to a line is to give alarm when the trouble appears, then a regular measurement test may be made.

HE HAD THE RIGHT IDEA.

DURING the illness of his daughter, who has been suffering with diphtheria, her father, Captain William E. Stubbs, of Chester, Pa., put up a telephone between his residence and that of a next-door neighbor, who also has a little daughter. Thus the pleasure of friendship between the little girl and her friend was kept up, without the possibility of contagion, while the house was quarantined.

The Week's Messages.

FINANCIAL

HOUSTON, ILL.—The Farmers Mutual Progressive Telephone Company, of Houston, has increased its capital stock from $190 to $1,500.

WOODBINE, IA.—The Woodbine Telephone Company has increased its capital stock from $25,000 to $50,000.

GOWER, MO.—The Seward Telephone Company has increased its capital stock from $7,000 to $12,600.

FREMONT, OHIO.—The Fremont Home Telephone Company has increased its capital stock from $100,000 to $125,000, the extra stock being preferred stock.

WEST FRANKLIN, PA.—Le Frank Telephone Company has sold all its stock and expects the line to be completed from Leroy to Franklin in a short time.

FORT WORTH, TEX.—The Texas Telephone Supply Company, of Fort Worth, has made an assignment. It was chartered in January, 1902, with a capital stock of $10,000 to deal in telephone supplies.

FRANCHISES

SAN DIEGO, CAL.—The Home Telephone Company has been granted a franchise by the city council. Under the provisions of the franchise it must expend at least $60,000 during the next 24 months or forfeit its franchise.

ST. JOHN, N. B., CANADA.—J. A. Magilton is the head of a new telephone company which is now soliciting subscribers, and will present a petition at the December meeting of the city council for a franchise.

DUNKIRK, IND.—At a special meeting of the city council a franchise was granted to W. J. Lineback, H. C. Teague, James O'Sullivan, George T. Whittaker, John C. Fudge, Samuel F. Long, Newton G. Weaver, John D. Steele, William G. Teague, George Black and Charles H. Hersch, all Dunkirk citizens, to construct and operate a local telephone system.

LAWRENCEBURG, IND.—The Lawrenceburg-Guilford and Dover Independent Telephone Company, which operates rural lines in this section, has been granted a franchise by the city council to construct and operate a plant here.

MASON CITY, IA.—J. Van Valkenberg and others have asked for a local telephone franchise.

WATERLOO, IA.—R. A. Davison has been granted a telephone franchise at the Waterloo city council. Mr. Davison refused at present to say anything other than that his backers will install a modern and up-to-date telephone service in Waterloo.

LENAXA, KAN.—The Lenaxa Telephone Company has secured a franchise and will begin the construction of an exchange at once. They will commence with 50 telephones in town and over 100 rural telephones.

BABYLON, L. I., N. Y.—The N. Y. and L. I. Telephone Company has been granted a franchise by the village trustees. It provides that the wires be placed underground, and it compels the company to give a bond of $5,000, and provides for free use of telephones by fire and police, and prevents the sale or transfer of the franchise without the consent of the trustees.

POCOMOKE CITY, MD.—The Berlin city council has granted a franchise to the Pocomoke City Telephone Company for the construction of a telephone plant in Berlin.

STEUBENVILLE, OHIO.—The Adams Exchange Telephone Company has secured the right-of-way to construct and operate a line on the Adena and Harrisville Pike.

NEW BRIGHTON, PA.—President J. G. Mitchell and J. F. Mitchell, R. D. Hunter and F. W. Walker, representing the Beaver County Telephone Company, appeared at a recent meeting of the city council and applied for a franchise.

MONTPELIER, VT.—The Orange County Telephone Company, represented by President Speare, Willis Cummins and Henry Town has been granted a franchise to construct and operate a system here.

SARDIS, W. VA.—The Sardis Telephone Company has applied to the city council of Lumberport for a franchise to construct and operate a telephone system in that town.

PERSONAL

CHARLES AUTH, who is secretary of the De Veau Telephone Manufacturing Company, of New York City, is to be married November 25 to Miss Emma Louise Stichl. The ceremony will take place in the church of the Heavenly Rest, Fifth Avenue and 45th street, New York City.

GEORGE DAVIS, of Sunbury, Pa., has been made superintendent of the United Telephone & Telegraph Company between Shamokin and Tamaqua, and William Fagley, of Shamokin, has been appointed general manager of the Bloomsburg district of the same company.

O. F. FRENCH, who has been acting general manager of the Cuyahoga Telephone Company, of Cleveland, Ohio, since the resignation of Mr. Turner, has been made the general manager of that company, relinquishing at the same time his office of assistant general manager of the Federal Telephone Company.

CAPEL HOLLAND has resigned as president and general manager of the Peoples' Telephone Company, of Morgantown, W. Va., and has been succeeded by Holly Brown.

F. W. KELLY, formerly manager of the telephone exchange at Oskaloosa, Ia., has assumed the management of the Interstate Telephone Company, at Springfield, Ill.—to which position he was recently appointed.

CHARLES Y. McVEY, manager of the Youngstown, Ohio, Telephone Company, has been appointed assistant general manager of the Federal Telephone Company, at Cleveland, Ohio. Mr. McVey will have charge of all the outside exchanges.

J. A. PRALL, of the Dubuque (Ia.) Telephone Company, has resigned his position. He has been engaged with various companies for the past fifteen years, and from here goes to Mexico, Mo., where he has a lucrative position.

H. F. SNYDER, superintendent of the Federal Telephone Company, will remove from Jeanette, Pa., to Greensburg, Pa.

MR. VAN LIEW, the general manager of the Home Company, of Los Angeles, Cal., is now on a visit in the East, combining business and pleasure. Mr. C. H. Temple, formerly of Richmond, Ind., is chief installer for the company. M. C. W. Linder, of Cleveland, Ohio, is chief switchboard man, and Mr. A. B. Fry, of Indianapolis, Ind., is wire chief.

COMBINATIONS

SYRACUSE, IND.—The Syracuse Telephone Exchange has passed into possession of Rev. Henry Arlere. J. F. B. Kauffman was the former owner.

HART, MICH.—The stockholders of the Oceana County Bell Telephone Company have decided to purchase the property of the Mason County Telephone Company.

CALIFORNIA, MO.—Mr. Cramer and J. H. Goodwin, of Bunceton, have sold the California Telephone Exchange to J. B. Kemper, of Fulton, Mo. A. B. McDavid will continue in charge of the business for a time. The price paid was $6,500.

LIVINGSTON, MONTANA.—Frank A. Hall, president of the Yellowstone Park Telephone & Telegraph Company, has returned from Madison county, where he purchased the telegraph line and all appliances of the Montana Southern Telegraph Company, whose line extends from Sappington to Virginia City. He also purchased the telephone line running from Norris to Meadow Creek and Ennis. Mr. Hall says these lines will be connected with the main office in this city.

MINT HILL, N. C.—The Mint Hill Telephone Company, of which Dr. Mack De Armonde is president and manager, has been sold to a company composed of Dr. De Armonde, C. H. Wolfe and W. B. Estridge, who will apply for a state charter. The property consists of a line from Charlotte to Mint Hill with about a dozen subscribers. The purchase price was $312.50. The New Company will considerably extend the system.

MANSFIELD, OHIO.—The Mansfield capitalists are endeavoring to purchase the Mansfield line of the Independent Telephone Company.

PEMBERVILLE, OHIO.—The Home Telephone Company, a recently

THE WEEK'S MESSAGES—Concluded.

organized concern, has purchased the local telephone exchange from the Bradner Telephone Company. The new company, which is composed of local business men, will be incorporated with a capital stock of $5,000 and will rebuild the plant and add a number of rural lines.

WAUSAUKEE, WIS.—The Wausaukee Telephone Company will sell its toll lines which connect the towns in the county and will hereafter confine its business to the operating of the Wausaukee exchange exclusively. The Bell Company has submitted a proposition for the purchase of the line, and unless some Independent company submits a better bid the lines will be sold to the Bell.

MISCELLANEOUS

UNIONVILLE, MO.—A telephone meeting will be held soon at this place for the purpose of determining how much stock each of three rural telephone companies of Putnam county have subscribed.

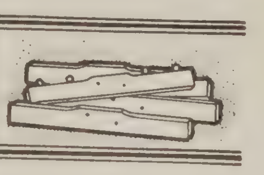
ELECTIONS

PAPILLON, NEB.—The Home Telephone Company has elected the following officers: I. D. Clarke, president; W. S. Rakor, vice-president; A. W. Clarke, treasurer; C. F. Calhoun, secretary. The directors declared a 10 per cent. dividend.

Hudson, N. Y.—At the first annual meeting of the Columbia Telephone Company the following board of direceors were elected: R. G. Foster, New Hartford, Conn.; Benjamin F. Case, Canton Center, Conn.; Edmo Charles Getty, Hudson, N. Y.; R. L. Andrews, New Britain, Conn.; J. H. Bidwell, Collinsvville, Conn.; D. T. Dyer, Collinsville, Conn.; E. M. Andrews, New Britain, Conn.

CEDARVILLE, OHIO.—The Cedarville Telephone Company has elected the following directors: D. Bradfute, O. E. Bradfute, F. B. Turnbull, J. H. Andrew and R. F. Kerr.

New Construction in the Field



AMERICUS, GA.—The Troutman Telephone Company is extending its line to Dunlap.

MOSCOW, IDAHO.—The Co-operative Interstate Telephone Company is constructing a line to Pullman. It has a line to Genessee and expects to extend it to Lewiston in a short time.

ROCKFORD, ILL.—The Rockford Home Telephone Company and the Belvidere Independent Telephone Exchange have arranged for the connection of the two cities by a telephone line.

FRANKLIN, IND.—The Franklin Telephone Company is arranging to issue bonds for improvements on the plant. The company is considering the advisability of placing all its wires underground, and at a recent meeting of the city council it asked for an extension of its franchise, which at present is good for 19 years longer.

FT. DODGE, IA.—The Stratford Telephone Line, which operates in this city, has arranged to make some very extensive improvements, including new poles and re-wiring.

REINBECK, IA.—The Mutual Telephone Company will construct a line from Reinbeck to Cedar Falls.

BALDWIN, KAN.—The La Cygne Telephone Company, of La Cygne, Kan., has completed the toll line to Pleasanton, Kan., and Amsterdam, Mo.

DOWNES, KAN.—The Downes-Western Telephone Company is preparing to rebuild its system at Phillipsburg, Kan., increasing the capacity from 100 to 200 telephones.

FULTON, KAN.—The Fulton Telephone Company has completed its construction in town and will soon commence building lines into the country to take care of the demands for rural telephones.

PITTSBURG, KAN.—The Pittsburg Home Telephone Company is arranging to construct a line from here to Scammon, Columbus and Galena.

DEXTER, ME.—Farmers of this section are talking of the organization of a farmers' telephone company to construct lines throughout the farmers' section.

PITTSFIELD, ME.—Charles Seekins has organized a farmers' telephone line to run from this village out into the country about six miles. A meeting will be held at the selectmen's office on November 28th for considering the granting of petitions to set poles along the highways.

NEW BEDFORD, MASS.—The Automatic Telephone Company contemplates establishing a new branch exchange in the north end of town in the near future. By so doing about 120 lines will be shortened besides bringing a great many subscribers within the mile limit, thereby reducing their rates.

CLINTON FALLS, MINN.—The Clinton Falls Rural Telephone System is constructing its exchange here and will extend a line to connect with the Owatonna (Minnesota) Telephone Exchange. The officers of the company are F. W. Adams, president; O. A. Newhall, secretary; William Sahler, treasurer.

GROVE CITY, MINN.—The Eastern Union Telephone Company is preparing to construct a line connecting Grove City and Atwater.

FAYETTE, MO.—The Howard County Telephone Company is making some extensive improvements in Fayette. It has purchased three cables at an expense of $2,000 and will make many other improvements.

ST. LOUIS, MO.—The Kinloch Telephone Company, which is building from St. Louis to Joplin, has its line completed and in operation to Sedalia. The Southwest Missouri Independent Telephone Company, which is building a system throughout southwest Missouri and northern Arkansas, will co-operate with the Kinloch line in the construction of new lines.

SUMNER, MO.—Dr. Hardy is preparing to establish a new telephone system at this place.

WAHOO, NEB.—The Farmers and Merchants Telephone Company, of Wilcox and Ragan, have made arrangements to connect with two other lines south and east of this place. By spring lines will be completed connecting Ragan, Alma, Hildreth, Upland and Franklin.

WEST POINT, NEB.—The Ainsworth Telephone Company is pushing the construction of its local system under the management of Joseph F. Jankele, and expects to have the line completed in a short time.

LEBANON, N. J.—The Lebanon Telephone Company is arranging to extend its line from the East White House to North Branch.

HUDSON, N. Y.—The Columbia Telephone Company installed their Blue Store Exchange recently and are now serving their subscribers. The line will be completed to Elizaville, Cokertown and Upper Red Hook in about two weeks.

OSWEGO, N. Y.—The Ontario Telephone Company, of Oswego, is installing an exchange at Mexico.

GLENULLIN, N. D.—Tavis and Moore, of this place, have secured a franchise and will construct a new telephone line from here to Leipsig, a distance of 25 miles.

HUNTER, N. D.—The Hunter Telephone Company is arranging to install an exchange at Grandin.

SPRINGFIELD, OHIO.—The Big Four Railway Company will construct a new telephone line on its St. Louis and Chicago division and on Seneca division.

CARBONDALE, PA.—The Northwestern Telephone Company is extending its lines from Tirgate to Gelatt, and will later build a line from Smiley Hollow to South Gibson. Arrangements are under way for the extension of the line of Vandling, and it is purposed to then extend to Carbondale, and perhaps to Scranton and Wilkesbarre.

CLEARFIELD, PA.—The Huntingdon and Clearfield Telephone Company has ordered the construction of a line from Clearfield to Hastings.

PITTSTON, PA.—The Consolidated Telephone Companies of Pa. have arranged to install several more wires from the Pittston exchange to Scranton and Wilkesbarre. The improvements will be under the direction of general superintendent Mr. J. F. Taudola, of Scranton.

FLANDREAU, S. D.—Stockholders of the Flandreau Telephone Company have decided to construct several rural lines extending to various parts of Moody county,

KNOXVILLE, TENN.—The People's Telephone Company will extend its toll lines to Middlesboro and Cumberland Gap. Manager Duncan is now surveying for the route.

REMOVAL OF TELEPHONE WIRES.

WHERE a telephone company, having previously maintained a telephone in a store, on being requested to remove it, did so, but against the proprietor's request neglected to remove the wires, merely twisting the ends of the wires together inside the building. By reason of the way in which the wires were left, lightning was conducted inside the store and injured the plaintiff, who was in the store on business with the proprietor. The Supreme Court of Alabama holds that the failure of the company to remove the wires constituted negligence, entitling the plaintiff to recover for the injuries sustained. 34 S. 1020.

SIMPLE WORKING SHOULD BE RETAINED.

MANY telephonists are of the opinion that the simplicity of working of the public end of the service that has now been made standard by the general adoption of the central energy system must be retained intact. There is probably no telephone man who has had experience of the working of the central energy system and of any other who would dissent from this proposition. If there are any that do dissent, it would be interesting to have their views, and the A. T. J. will gladly print them. The overwhelming advantage of the automatic operation of the service from the subscribers' end of the system lies not only in the quickness and accuracy resulting from the use of distinctive lamp signals, but also in the absolute uniformity of working. On the central energy system any telephone in any part of the country is worked in exactly the same way. You lift the telephone off the hook to call and you replace it on the hook when you have finised and go about your business. Any fool knows enough to do that—that is, not to go about his business, but to lift the telephone when he wants a call and to replace it when he has finished. It is true that some, accustomed to one or other of the heterogeneous ways of working the telephone prevalent before central energy was introduced, may want to do something or other before they lift the receiver, but since there is nothing they can do, they will soon get over that. On the other hand, the simple working appeals to all, and practically anybody can use the telephone with ease and satisfaction, while by no awkwardness nor lapse of memory can they clog the service.

TRADE NOTES

The Ingram Richardson Manufacturing Company, of Beaver Falls, Pa., which deals in enameled iron signs, has increased its capital stock from $10,000 to $25,000.

The Kellogg Switchboard and Supply Company, of Chicago, Ill., has lately received an order from the Cuyahoga Telephone Company, of Cleveland, for 8,050 telephones, 5,000 wall sets, 2,500 desk sets and 550 Pay Station sets.

The Stromberg-Carlson Telephone Manufacturing Company of Chicago and Rochester reports that its cable department is running full blast. A recent shipment of 60,000 feet of underground cable was made to the Keystone Telephone Co. of Pennsylvania. The company can manufacture cable to any specification.

The Eureka Electric Company, of Chicago and Genoa, Ill.. has just closed contracts for immediate shipment of a very large outfit of its improved telephone apparatus for installation at Ceba, Philippine Islands. The Government of Salvador has just placed another contract for a large shipment with this company after having used and endorsed their apparatus for the last five years.

The F. Bissell Company, Huron street, Toledo, Ohio, has issued its Bulletin No. 6, which deals with the different wire products that the company handles. Everything in the wire and cable line is described, from one-half-inch steel guy strand to No. 40 copper magnet wire, and from 300-pair cable to transmitter cords. Incorporated with the catalogue is a goodly quantity of wire information, and many valuable wire tables. The bulletin is arranged to be bound in a loose leaf cover, is well worth having and will be sent to anyone interested.

The H. B. Camp Company, of 170 Broadway, New York, has issued a leafelet which it calls "Something New in Conduit." In it is described the Lake Divided Camp Tile, the patent for which was recently issued. The product is now being manufactured by the Camp company. This new duct is of the split type, but instead of the tile being split to that the cracks come diametrically opposite with respect to each other, it is so divided that the walls are offset. When the tile is laid the joints in any one tile will be offset with respect to the joints in the adjacent tiles. Several cases of special adaptability for this type of tile are described and illustrated, and are well worth looking over. The leaflet is well and artistically gotten up.

The Electric Appliance Company, of 92 & 94 West Van Buren St., Chicago, is distributing samples of new inside telephone wire. This wire differs from any other inside telephone wire in the insulation, which instead of being rubber is composed of two wrappings of cotton, each thoroughly saturated with the celebrated O. K. weather-proof compound, over which is placed a glazed cotton braid of suitable color. This makes a very substantial and durable wire. Is claimed to be superior to rubber, as it will not deteriorate, while rubber, particularly the cheaper grades of rubber covered telephone wire, will readily rot out, making it impossible to ever use it again after having been in service a short time. This O. K. Duplex glazed braid telephone wire is not adapted for outside work, and is intended only for inside wiring. The prices run considerably under that of good telephone wire.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

POSITION.—A first-class construction man with thirteen (13) years' experience in telephone (both Independent and Bell) and electric light work, desires connection with a telephone company in its construction department. Will be at liberty Nov. 30. Address, Box 99, The American Telephone Journal, 116 Nassau St., New York City. 99.

WANTED—All or any part of $50,000.00. WRITE TO-DAY for particulars. The BIGGEST PAYING TELEPHONE PROPOSITION of the day. OPEN for a LIMITED length of TIME only. Address, Box 107, The American Telephone Journal, 116 Nassau St., New York City. 107

WANTED; shop foreman, also traveling salesman for telephone house. Address, Box 106, The American Telephone Journal, 116 Nassau St., New York City. 106

WANTED.—A few young telephone men of good character and with best references to do extra work. Liberal compensation offered to the right men. Address, Box 103, care The American Telephone Journal, 116 Nassau Street, New York City. 103.

POSITION—Switchboard work or wire chief. Married, sober, steady, reliable, technical education, 8 yrs. electrical experience. Familiar with all modern telephone apparatus, power work, etc. Lock Box 334, Sheldon, Ill. 105

TO BUY for cash, telephone exchange of 250 to 500 subscribers in Middle or Western state. Address, Box 104, care of The American Telephone Journal, 116 Nassau St., New York City. 104

MANAGER—A good, live, energetic, capable man of experience wanted to manage a large Independent telephone system in the West. Must be able to invest not less than $10,000 in the company. Address Box 102, The American Telephone Journal, No. 116 Nassau street, New York City. 102

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau St., New York City. 73.

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VOLUME VIII SATURDAY, NOVEMBER 21, 1903 NUMBER 21

AN ENGLISH BRANCH EXCHANGE

By Chester V. Barry.

SCATTERED throughout the Thames valley in the vicinity of London are several branch or sub-exchanges, which serve the districts in which they are located. Fig. 1 shows a view of one of these located at Putney and it is so nearly like the rest of the small branches that a description of it will cover the others. The ultimate number of subscribers to these exchanges is expected to never exceed 1,000, so the boards are not multiple. A common battery is used for signalling, but the equipment is local battery talking. Lamp signals are used both for line and supervisory purposes, and they are automatic as in a straight common battery system.

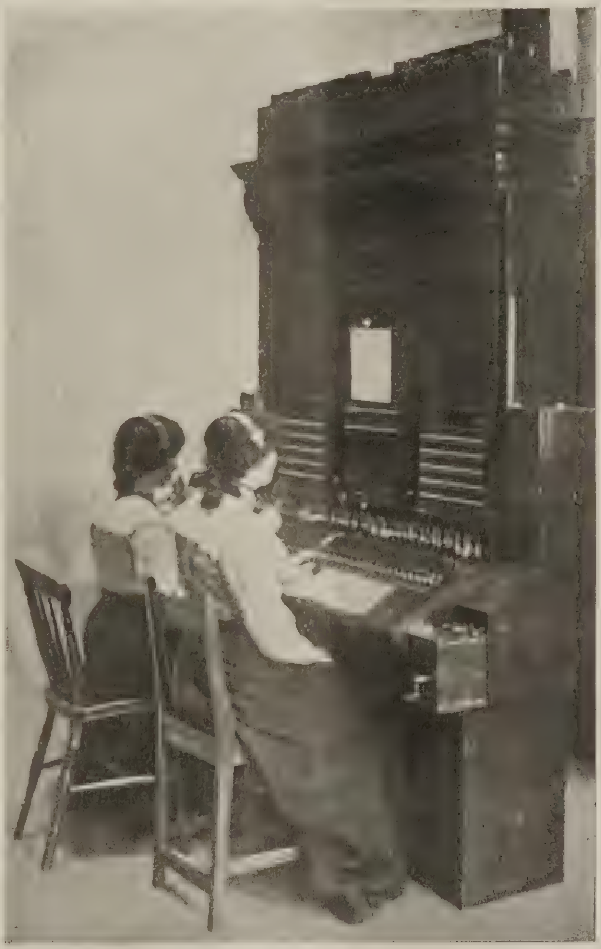


Fig. 1. The Branch Exchange of the Metropolitan System at Putney.

The board shown in the photograph has an ultimate capacity of 200 lines, which will be a standard for these small exchanges. Of the three panels, the two outer ones are occupied by the line lamps and jacks and in the center panel are the trunking signals and jacks, or as they are called in England, junction jacks. The board is arranged to accommodate two operators. The round affairs on the top of the switchboard in the square boxes contain the cord circuit relays. The other relays, except those on the trunk circuits, are inside of the boards and are accessible by removing the back. The trunking relays are on a rack in the rack room. The hand generator at the right of the board is used at night, or in case the power generator should break down, so there will always be ringing current.

Fig. 2 shows a closer view of the key-desk and jack panels. Thirty-eight pairs of cords are used, each pair having its own combination listening and ringing key. The ten pairs of cords that have the white collar around them, which are arranged in groups of twos and threes among the others, are used in making incoming trunk connections. This leaves 28 pairs of cords to be used for local connections. For the purpose of distinguishing, the shanks of the answering plugs are colored black and those of the calling plugs are colored red.

Arranged along the bottoms of each of the three panels are the supervisory lamps, or, as they call them, the "clearing indicators," there being, of course, 2 lamps for each pair of cords. The front lamp will light when the front plug of the pair associated with it is inserted into the jack of some subscribers' line, and will remain lighted until the receiver of that instrument is taken from its hook. The same holds true of the back cord and lamp. As long as the receiver is off the hook, the lamp will remain lighted. In the larger London exchanges a toll meter is provided each limited service line to actuate which a key is arranged in each cord circuit. In the smaller exchanges it was deemed advantageous to dispense with the toll meter.

Occupying the central portion of the two outside panels are the local line jacks and the lamps associated with them. As is obvious from the photograph taken there are 5 rows of 20 lamps and jacks each. Each jack is placed above its line lamp. Above the line lamps and jacks is a row of order wire keys, or, as they are called over there, "call wire keys." These are used when the local operator wishes to order a trunk connection to another exchange. By pressing one of these keys she is connected directly with the operator in the distant exchange and can give her order.

In the middle section, just above the supervisory, the outgoing trunk or junction jacks are arranged. The lamps and jacks at the top of this panel are for incoming trunk purposes.

It will be noticed that there are two supervisory or clearing lamps for each trunk. The pilot lamp, which glows whenever a subscriber takes his receiver from the hook to call, is just below the center of the middle panel. Quite near the top of the middle panel is a drop or indicator, which is self-restoring. This is used to notify the night operator of a call on an incoming call wire. At the left hand of each of the operators are five keys. Two of them are used for ringing stations on party lines and one can be used for ringing on any outgoing call-wire at night or during the dull periods of the day. It has been so arranged that when one of the operators withdraws the plug, which connects her telephone set to the board, from its jack, the two operators' circuits are connected in multiple, so that the board can be handled by one operator.

THE INTERSTATE TELEPHONE CONVENTION

E. M. COLEMAN, secretary of the Interstate Independent Telephone Association, is sending the following letter to telephone men throughout the country. The letter speaks for itself:

"You are urged by the officers and executive board to attend the third annual convention of the Interstate Independent Telephone Association which meets at the Auditorium, Chicago, Ill., December 8, 9 and 10, 1903.

"This letter is intended for you and everyone interested in the success of the Independent telephone movement.

"The coming convention will be the most important meeting of business men ever held in this country.

"This is the critical time in the telephone business, and something definite along practical lines must be accomplished at this convention to protect your interests and your investments.

"This will be a business convention and you should be present to help shape the destiny of Independent telephony.

"We cannot successfully fight, separately, an organized enemy. Your money and the greatest good of the general public looks to you to meet us and join hands with us in this struggle.

"Vital questions will certainly be discussed and determined.

"In addition to the vital and all important business to be transacted royal entertainment has been provided.

"An elaborate banquet surpassing that of any former convention will be given.

"Notify the Secretary at once of your intentions to be at the convention, in order that proper arrangements can be made for your entertainment. Act quick! Time is short."

The following programme has been arranged:

TUESDAY MORNING, DEC. 8.

A reception of friends and members by the executive committee and officers at the secretary's headquarters, and distribution of tickets to the banquet and concert.

TUESDAY AFTERNOON.

Address of Welcome, Hon. Carter H. Harrison, Mayor of Chicago.

Response and Annual Address by President, Senator C. E. Hull, Salem, Ill.

Report of the Secretary.

Report of the Treasurer.

Selection of Executive Board.

Selection of Nominating Committee.

Revision of Constitution and By-Laws.

Adjournment.

WEDNESDAY MORNING, DEC. 9.

The officers and executive board will take charge of the delegates this morning from 9 to 12. Visiting exhibits.

WEDNESDAY AFTERNOON.

Should the Territory of the Interstate Independent Association be enlarged, and if so Why? Hon. John Van Nortwick, Appleton, Wis.

Are Our Telephone Periodicals Sufficiently Careful as to the Business Relations Sustained by Contributors? W. H. McDonough, New York City.

Standardization of Apparatus, Prof. J. C. Kelsey, Purdue University.

Standardization of Construction, W. C. Polk, Kansas City, Mo.

Competition Between Independent Companies and Farmers' Mutuals, O. Rex, North Manchester, Ind.

THURSDAY MORNING, DEC. 10.

Independent Toll Line Systems, and is the Time Ripe for Merging, J. S. Brailey, Jr., Toledo, O.

Where Should the Line of Demarcation be Drawn Between Independent Operating and Manufacturing Companies and the Bell Company? Hon. Henry A. Barnhart, Rochester, Ind.

What Should be the Representation of the Interstate Independent Telephone Association in Voting? David Prewitt, Winchester, Ky.

Who is Who? What are the True Ear Marks? Hon. Theodore Gary, Macon, Mo.

Election of officers.

THURSDAY AFTERNOON.

Visiting exhibits.

The present officers of the association are: C. E. Hull, president, Salem, Ill.; L. A. Frazee, vice-president, Connersville, Ind.; E. M. Coleman, secretary, Louisville, Ky.; J. W. Layne, treasurer, Carthage, Mo. The executive board consists of A. B. Conklin, Aurora, Ill.; H. S. Herr, Ottumwa, Iowa; O. Rex, North Manchester, Ind.; A. L. Hutchinson, Weyauwega, Wis.; E. H. Moulton, Minneapolis, Minn.; W. Guy Jones, Columbus, Ohio; W. F. Hall, Clinton, Mo.; J. B. Ware, Detroit, Mich.; David Prewitt, Winchester, Ky.

SOUTHERN INDIANA ASSOCIATION CONVENTION

By L. B. Sisson, *Special Correspondent.*

TWO large conventions of rival telephone associations were convened at Evansville, Ind., during Tuesday, Wednesday and Thursday, the 5th, 6th and 7th of November. The Cumberland-Bell faction had representatives of its main exchanges from Kentucky, Illinois and Indiana. The Independent people were represented by presidents and managers from all over the region, and the meeting was held under the direction of the Independent Telephone Association. The reason for both meetings is evident. The Cumberland Company realized that a display of strength and power, which their various addresses and reports were calculated to inspire, was necessary to stay, at this critical moment, the movement against them in Evansville and surrounding towns. They have awakened from their lethargy to find themselves embarrassed throughout all this section, by flourishing Independent companies.

The private concerns, on their part, know what an important centre of trade Evansville is, forming as it does the gateway to the South; hence they rallied to the support of the new Independent company here and met the opposition fair and square. The tenor of the meetings was opposite. Lengthy speeches by Assistant General Manager Leland Hume, of the Cumberland and verbose reports by the different managers of the Bell system, characterized the syndicate meeting. On the other side crisp business address, and sworn statements of the number of patrons, amount of capitalization and dividends paid or due, gave to the public the exact truth of existing Independent conditions.

The result of the Bell meeting was a long tirade, published in the Evansville *Courier-Journal*, a Bell organ, warning the country in general against "wildcat" Independent companies and appealing to the people of Evansville in particular to down the municipal Independent telephone company now building its plant there. Some of the assertions made in this invective article would make the Sphinx smile. Their statement of maintaining an efficient and up-to-date system in Evansville is manifestly false, it being notoriously one of the worst city systems in this country. They pointed to the few failures of Independent companies, but failed to mention the present condition of the Central Union companies and the recent sale by a receiver of the Michigan Bell Company, whose condition is hopeless. The reports of the local Independent companies which were anything but in the Bell's favor were also entirely overlooked.

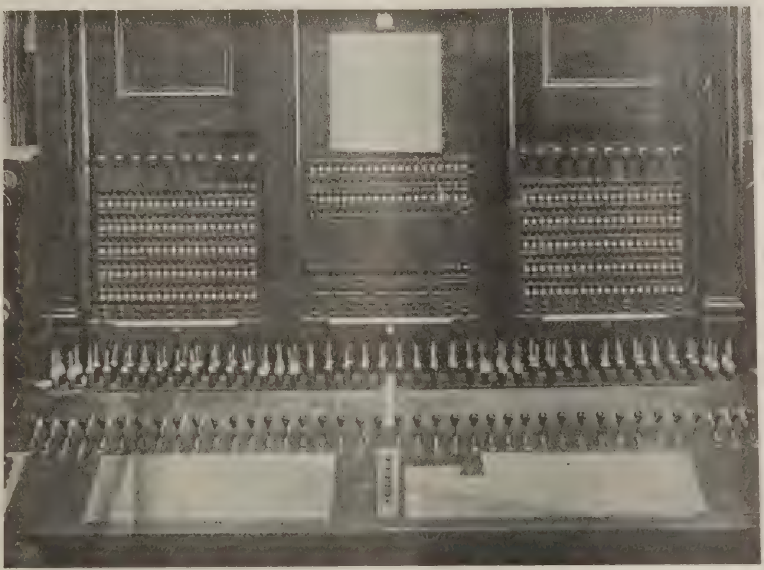


Fig. 2. Photograph of Panels and Key Desk in the Putney Exchange.

All Independent construction companies, manufacturers and promoters were denounced as swindlers of the public's money and as causing "untold distress and anguish of mind" in many families, whose savings have been placed at the disposal of "Independent companies," backed by these promoters. The result of the Independent company meeting was a stronger organization and an evident strengthening of the Evansville Independent company.

The situation at Evansville, then, resolves itself thus: The Independent company will put up its plant in Evansville and connect with the long distance Independent lines. The Bell Company will continue its fight in the Supreme Court against the revocation of its franchise in Evansville. That they will ultimately be ousted is the opinion of even the most conservative business men in Indiana. Then, with a clear field and with the most successful business men in Evansville as directors and shareholders, the Independent plant cannot help but flourish.

The Independent convention, the fourth annual of the Southern Indiana Association, was formally opened on Tuesday, November 5, and continued through Wednesday. The attendance was good, there being about seventy-five delegates present.

The convention commenced Tuesday afternoon, with an address of welcome by Hon. Charles G. Covert, mayor of Evansville. Mr. G. A. Kienle, president of the association, responded in its behalf with a brief address. The first paper presented for discussion was one by City Attorney Hon. Albert W. Funkhouser, on the "Telephone Situation at Evansville." After the reading of the paper it was thoroughly discussed by the members. The meeting then adjourned for the day. In the evening a banquet took place, which the members attended and greatly enjoyed.

On Wednesday morning the meeting was opened by the announcement of the vice-president of the association, Charles D. Knoefel, that he, being first on the programme, would resign the chair to Mr. Cole, of Owensboro.

After Mr. Knoefel's paper on "Independent Long Distance Lines," Hon. A. J. Payton, of Rockport, read a paper on "The Bell People as Antagonists." The committees then reported.

Mr. Knoefel's paper attracted considerable attention. In his introductory speech he paid especial attention to the early mistakes which were made in the construction of long distance lines, showing that "cheap" methods prevailed largely. He also spoke of the early trouble of Independent companies, when they began business in Indiana eight years ago of getting long distance connection, "but to-day," said the speaker, "through the Independent long distance companies at Indianapolis and Louisville, the state of Indiana is connected. New Albany, Indianapolis, Fort Wayne, South Bend, Elkhart, Goshen, Lafayette, Vevay, Terre Haute, Vincennes, Rockport, Princeton, and Huntingburg—in fact, nearly all towns and cities in Indiana, as well as those in Ohio and Kentucky—are all connected with Louisville and are looking forward to having Evansville added to the list. The Independent long distance telephone system in Indiana to-day connects with 60,000 telephones, while Bell has only half that number." He then continued reviewing what experience had taught the Independents, making strong arguments for the best material.

Following Mr. Knoefel's paper came the election of officers, who were chosen upon the recommendation of the committee on nominations. The officers elected were:

President—Chas. D. Knoefel, New Albany.
Vice-President—L. G. Davis, Salem.
Secretary—E. W. Pickhardt, Huntingburg.
Treasurer—T. M. Thorn, Lamar.

Before the adjournment of the convention three series of resolutions were adopted, one reasserting the purposes of the association to extend the field of their business, the second thanking the city, the Evansville Telephone Company, the society in whose hall the convention was held, and the newspapers for their manifestations of kindness, and the third, a congratulatory resolution from the Kentucky association to the city of Evansville.

PRIVATE BRANCH EXCHANGE OPERATORS.

PROBABLY no single modern invention has made so many opportunities for women as the telephone. In New York City alone there are some 4,400 switchboards requiring operators, practically all of whom are women. The number is increasing all the time. Every hotel and apartment house of any consequence, every business and office building, every municipal building, has its own switchboard.

THE INTERNATIONAL ELECTRICAL CONGRESS

WE are informed that the following appointments for the officers of the various sections, have been made by Prof. Elihu Thompson, president of the Committee of Organization of the International Electrical Congress, which will be held in St. Louis in September, from the 12th to the 17th, in 1904.

It is understood that all of these gentlemen, who are well known specialists in the departments they represent, have already accepted these appointments, with the exception of one who has as yet been unable to accept, owing to absence in Europe, but who is now returning. The Section Officers will have charge of the proceedings of the Congress at St. Louis in their respective sections. The papers that are to be read at the Congress will be communicated by invitation from well known authors in this country and abroad. They are to be read and discussed at St. Louis during the Congress week, 12-17th September, 1904. They are then to be printed and published in book form.

Invitations to join the Congress are steadily being issued to persons and parties interested in electricity. Over 6,000 such circular letters of invitation will be sent out in the United States, and a similar number of foreign countries. Most of the circulars are being directed to members of electrical industries, societies, and scientific institutions. Joining the Congress will entitle the member to attend the various functions at St. Louis and also receive a copy of the subsequent transactions. It is expected that many will join the Congress who cannot expect to attend the sessions in St. Louis, merely to receive the subsequently printed transactions. The transactions are expected to form a very valuable addition to electrical literature, both theoretical and practical. Already about 350 Americans have joined the Congress in response to circulars, and only part of the circular catalogue has been covered. There is, consequently, every reason to expect a large and representative membership in the Congress, both from this country and abroad. Communications concerning the Congress should be addressed to the General Secretary, Dr. A. E. Kennelly, Cambridge, Mass.

Section.		Subject.	Chairman.	Secretary.
A		General Theory Mathematical Experimental	Prof. E. L. Nichols, Cornell University.	Prof. H. T. Barnes, McGill University.
B	Applications.	General Applications	Dr. C. P. Steinmets, Schenectady, N. Y.	Prof. Samuel Sheldon, Poly. Inst., Brooklyn.
C		Electrochemistry	Prof. H. S. Carhart, University of Michigan.	Mr. Carl Hering, Philadelphia.
D		Electric Power Transmission	Mr. Chas. F. Scott, Pittsburg.	Dr. Louis Bell, Boston.
E		Electric Light and Distribution	Mr. J. W. Lieb, Jr., New York.	Mr. Gano S. Dunn, Ampere, N. J.
F		Electric Transportation	Dr. Louis Duncan, Mass. Inst. Tech.	Mr. A. H. Armstrong, Schenectady.
G		Electric Communication	Mr. F. W. Jones, New York.	Mr. B. Gherardi, Jr., New York.
H		Electro Therapeutics	Dr. W. J. Morton, New York.	Mr. W. J. Jenks, New York.

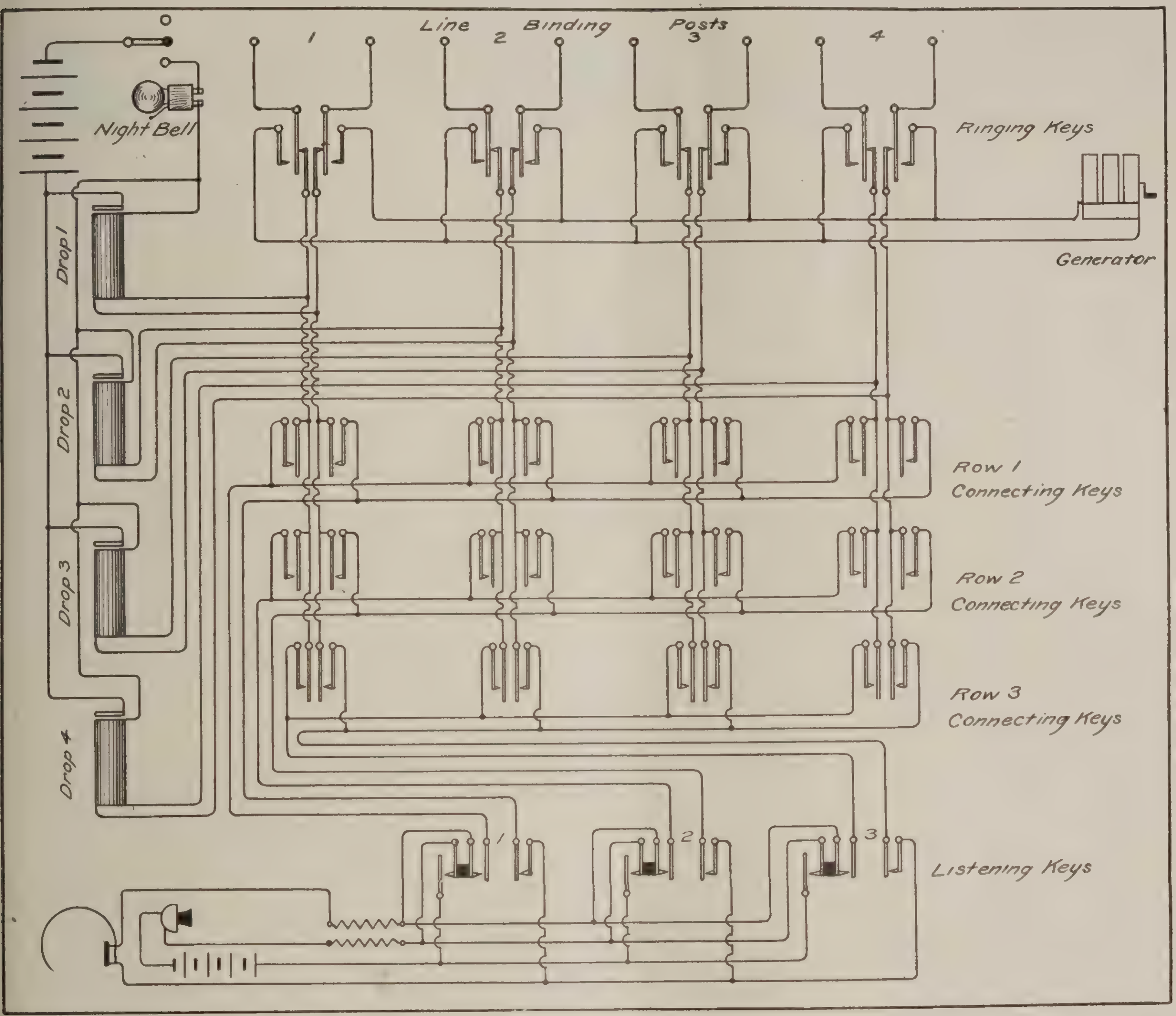
THE FIELD TELEPHONE SWITCHBOARD OF THE UNITED STATES SIGNAL CORPS

By Harold Cramer.

THE use of the telephone in signal corps operations is so thoroughly apparent that it is hardly necessary to go into the details of its many advantages. A switchboard for this class of work must of necessity be small, compact and portable. The board developed and in use by the United States Signal Corps fulfills these conditions.

The 10 line switchboard, with its complete equipment, is contained in a stout wooden box 15 inches high, 14½ inches wide and 9½ inches deep, and weighs, when completely equipped for service, about 34 pounds. The equipment consists of ten 500 ohm tubular drops, 10 ringing keys; 30 connecting keys; 3 listening keys; a combined receiver and transmitter for the operator's set; an operator's induction coil; a magneto hand generator; a night bell, or buzzer, and switch, and four cells of dry battery. The equipment is mounted on a hard rubber panel which is set into the front of the box, the drops being mounted in one row at the top of the panel, the ringing keys directly below them, and the connecting keys in three rows of 10 each below the ringing keys. The three listening keys are mounted in the front board below the equipment already mentioned. The bottom of the front board is recessed so as to contain the combined transmitter and receiver when the board is closed and not in use. The box is provided with a hinged front cover which has on its inner side a facing of felt, which, when the door is closed, serves to keep the drop shutters from falling during transportation. The back of the box is also hinged so as to allow of easy access to the wiring. The terminals for the incoming lines consists of binding posts which are mounted on the top of the box and are protected by a hinged cover.

The method of wiring and of operation is shown in the diagram. The incoming lines are wired from the binding posts to the long springs of the ringing keys, each line having its own ringing key; from the inner contaces of these keys wires are led to the line drops, the effect being to permanently bridge the drop across the line when the ringing key is in its normal position. The hand generator is connected to the outer spring of the ringing keys, as shown. A pair of wires is run from the inner springs of these keys and connected to the long springs of a connecting key in each row, the outer springs of these connecting keys being strapped together by a pair of wires, as shown, and the strap wires of each row connected to the inner springs of the listening key corresponding to the row.

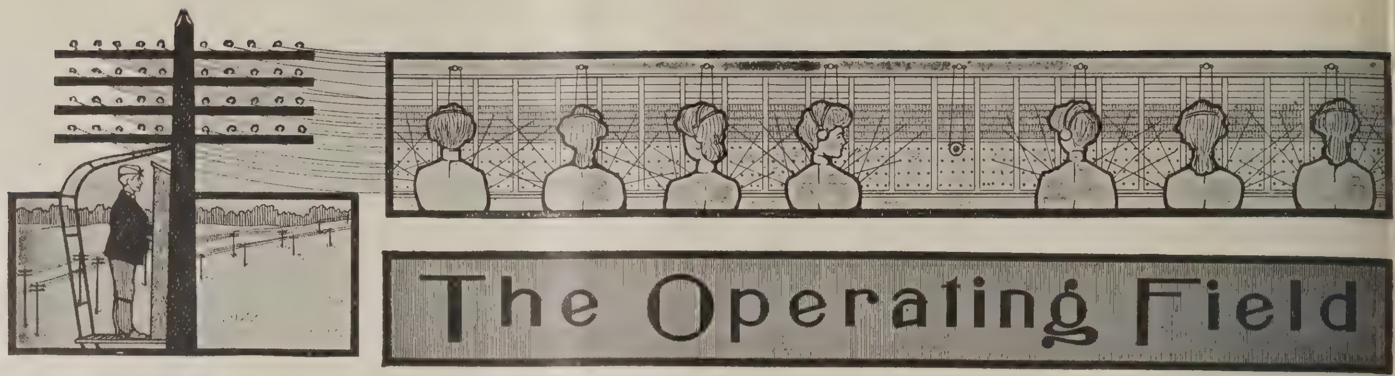


The operation of the listening key serves to close the battery circuit, through the transmitter and the primary winding of the induction coil, and thus prevents current from being drawn from the battery when the operator's transmitter is not in use. The operation of any two connecting keys, in the same row, serves to connect together the lines to which the keys correspond, and as there are three connecting rows, it will be seen that there can be three separate connections through the board at the same time. The operator can at any time supervise a connection by throwing the proper listening key, and it will also be seen that, if desired, a number of lines may be connected together at the same time, it being necessary to operate the proper connecting keys. The line signal being permanently bridged across the line, acts also as a clearing-out signal. The instruments, used at distant stations, are, of course, of the magneto type and equipped with local batteries and a magneto generator.

NEBRASKA ASSOCIATION ORGANIZED

FORTY representatives of fifteen Independent telephone companies doing business in Nebraska met at Fremont, Nebraska, on November 10, and formed an organization to be known as the Nebraska Independent Toll Line Association, and having for its object the bringing about of a system of putting toll lines on a paying and satisfactory basis. The next meeting, at which the organization will be perfected, will be held at Lincoln in January. The session was an exceedingly short one. Most of the delegates arrived in the morning and were driven through the city and given an opportunity to inspect thoroughly the Fremont plant. At 1:30 in the afternoon the business session was called to order and the following officers were elected: President, I. D. Clarke, Papillion; vice-president, J. H. Heine, Hooper; auditor and treasurer, W. D. Crist, Fremont.

A rate committee was named with power to arrange a business basis. It consists of A. M. Munn, of Nebraska City; O. W. Tharp, of Wahoo; F. H. Pollock, of Plattsmouth; J. C. Killarney, of Auburn; A. E. Grant, of Falls City. A membership committee was named consisting of W. C. Walton, of Blair; A. R. Dodson, of Valley, and H. C. Vail, of Arlington. The aggregate number of telephones in use by the companies represented at the meeting is 10,500. Delegates to the meeting were sent by companies having headquarters at the following named towns: Lincoln, Plattsmouth, Columbus, Nebraska City, Fremont, Hooper, Herman, Blair, Arlington, Ashland, Valley, Papillion, Auburn, Wahoo and Falls City. These concerns have connections covering or extending into sixteen counties and reaching more than one hundred Nebraska towns.



The Operating Field

INDEPENDENT operators made a strong effort to gain a foothold in Cincinnati recently. This attack was the most formidable one that has been made to date. The meeting was held in the council chamber at the City Hall. Managers of Independent telephone companies and systems in the principal cities of Ohio, Indiana and Kentucky appeared before the Council Committee on Telephones and took it by storm, as it were. The occasion was a hearing on the application of the Queen City Telephone Company for a franchise to do business in that city. Attorney C. Bentley Matthews and Secretary Harry B. Gates, of the company, requested the committee to grant a hearing to the managers of the Independent companies in other cities, so as to present direct and authoritative evidence as to what has been accomplished in the way of establishing the Independent systems and their growth as compared with the Bell company. This was granted. Mr. Matthews was the first speaker. Arguments were also made by the following:

J. B. Hoge, vice-president United States Telephone Company, Cleveland, Ohio.

F. L. Beam, general manager Citizens' Telephone Company, Columbus, Ohio.

G. P. Thorpe, secretary Clinton Home Telephone Company, Wilmington, Ohio.

C. L. Hildebrant, treasurer Clinton Home Telephone Company, Wilmington, Ohio.

W. B. Richie, Lima, Ohio.

D. L. Pendleton, president Kentucky Independent Telephone Association, Winchester, Ky.

S. P. Sheerin, Indianapolis, Ind.

L. C. Walker, Indianapolis, Ind.

C. A. Bookwalter, Indianapolis, Ind.

A. L. Johnson, Muncie, Ind.

A. L. Frazee, Connersville, Ind.

A. L. Tetu, general manager Home Telephone Company, Louisville, Ky.

D. L. Prewitt, Pine Grove, Ky.

J. C. Duncan, Knoxville, Tenn.

The new company has a capital stock of $1,000,000, all subscribed, and this will be increased to $4,000,000 as soon as it gets the franchise. In three weeks it will have secured over 2,000 subscribers in Cincinnati.

Mr. Hoge said that there are about 500 Independent exchanges, with 150,000 subscribers in Ohio, and that they are connected with Michigan and adjoining states, and they all want connection with Cincinnati to do business there. It was stated that Cleveland, Columbus, Indianapolis, Louisville and other cities are getting a large amount of business away from Cincinnati on account of their Independent telephone connections.

Mayor Bookwalter, of Indianapolis, said that the Independent system of telephones had done more toward the growth of Indianapolis in the last six years than anything else in a commercial way. It was argued that the double system decreased the cost and increased the value of the service by giving the patrons more persons to talk to and makes the service more satisfactory. It was claimed by the various speakers that the Bell Company really has no reason to object, as it always has its number of subscribers increased after an Independent company gets a foothold in a place. They all declared, however, that the Independent service is vastly superior to the other, and that its long distance connections are more accessible and cheaper, and that in consequence its patrons far exceed those of its rival. It was pointed out that with double service, when one telephone is in use the patron can use the other, and that in case of the main exchange of one system being destroyed by fire the city would not be without telephone communications, but would have the other system to fall back on.

S. P. Sheerin, of the New Telephone Company of Indianapolis, said that there are 107,000 Independent telephones in Indiana, and 7,725 in Indianapolis, with $8,000,000 invested in Independent companies in Indiana, and a debt of less than 20 per cent.

Mr. Gates stated that he would submit a list of subscribers to the company's telephones and the different kinds of contracts that they have to the committee, and submitted a list of its stockholders. He stated that all the officers have been elected, but refused to tell who they were at present, as it is expected there will be changes as soon as the franchise is granted, and that the officers will all be Cincinnati people eventually. He said that they would agree to begin work within 15 days, and to have the exchange in operation within two years. In reply to questions from Mr. Mullen he stated that their contracts provide that they would make no charges whatever for their telephone services until they have 10,000 bona fide subscribers.

SALE OF MICHIGAN CO. IS CONTESTED.

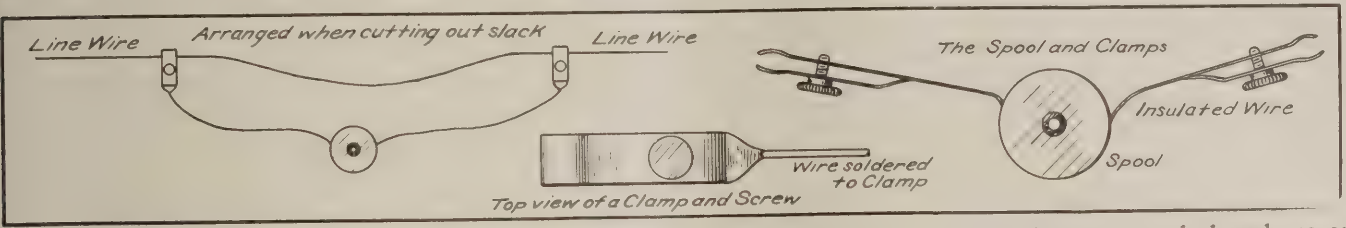
PROTESTS against the confirmation of the recent sale of the property of the Michigan Telephone Company for $4,100,000 have been filed in the United States Circuit Court at Detroit on behalf of trustees who represent some 381 stockholders and some 3,540 shares of stock. The bills of complaint filed, charge fraud and collusion between the officers or directors of the Michigan Telephone Company, the American Telephone & Telegraph Company and the bondholders, the juggling of books and accounts, diversion of funds, and general misrepresentation and mismanagement for the purpose of ruining the company for the benefit of the bondholders. It is claimed that the company's revenue during 1902 was sufficient, if properly handled, to take care of the interest on the bonds, but through the alleged collusive understanding mentioned, the funds were diverted, bringing about the default and disclosure. An order was made by the court directing that confirmation of the sale be stayed until further order of the court and that the Old Colony Trust Co. and the purchaser of the bonds show cause why the sale should not be set aside.

BIG INCREASE IN TRI-CITIES.

DIRECTORY No. 2 of the new Independent Telephone Co., of Davenport, Iowa, is being delivered to its subscribers, and shows a large increase in patrons over the directory issued last spring, Davenport alone having more than double the number of subscribers it had early in the year. Considering that the tri-city service was only inaugurated by the company last April, the growth of the past few months has exceeded all expectations of the company's officers. There is a total of 3,018 names in the directory, 1,054 being the number of the Davenport patrons, 1,094 being the names on the Rock Island list, and 870 being the number on the Moline list. While Davenport has grown very rapidly, yet the percentage of increase is greatest in Moline, where there are now less than a dozen vacant lines on the switchboard. The company is now constructing its lines in Rock Island County, and soon will take up new construction throughout Scott County. On the last pages of this directory is a list of nearly 2,000 stations in Iowa, Illinois, Minnesota, and Missouri with which the company now has satisfactory long distance connection which will be largely augmented, and St. Louis will probably be connected in December.

FOR THE LINE REPAIRER'S USE.

SHOWN in the drawings is a little arrangement which is handy where it is often necessary to go out on the line and take out the slack. Frequently when the repairer pulls up the slack and prepares to make a new splice he cuts the line wide open, and in many cases cuts off a conversation which is taking place. By the use of this little device such annoyances can be avoided. The drawings are almost self-explanatory, but a little description may aid in their understanding. Two clamps are soldered (one at each end) to a piece of insulated wire of a small enough diameter to be easily handled. The wire is then coiled on a spool in such a way that both of the ends are available. When it is desired to cut out slack the wire on the spool is arranged around the point where the line wire is to be cut and connected to the line wire by means of the two clamps. The slack is then pulled and the connection made without interrupting the service. The length of wire to be used will depend on circumstances. Forty feet has been found a handy length.



DEFECTIVE CROSSARM NO NEGLIGENCE.

THE Court of Appeals of Maryland has held that it was not negligence on the part of a telephone company to place upon the top of a pole a crossarm in which there was a knot, the defect having been obscured by paint and being one not discoverable by ordinary inspection. The plaintiff, an experienced lineman, was injured by the breaking of a crossarm at the top of a telephone pole. The arm broke while plaintiff was straining certain wires upon it, by reason of the knot which was near where one of the pins, inserted to hold the insulators, was placed. The arm was one of the ordinary kind and was painted before the telephone company bought it. On the lineman suing the company for damages, the trial court submitted the case to the jury, although asked to direct a verdict for defendant. This was held to have been an error as the facts were not sufficient to establish defendant's negligence. Maryland Telephone & Telegraph Co., 55 A. 681.

SOME ERRORS CORRECTED.

ATTENTION is called to some typographical errors which crept into Article XII. of Telephone Exchange Engineering, by Ray H. Manson, Albion D. T. Libby and Charles A. Simpson, which was published on October 10. On page 231, in the left-hand column, in the thirteenth line, under the head of Murray Loop Test, the expression $= 1 - X$ occurs. This should be $= L - x$. On page 231, in the right-hand column, in the fifth line from the top, the fraction $\frac{818}{.0085}$ occurs. This should be $\frac{8.18}{.0085}$

There were several errors in the description of the capacity test, so it is thought best to again print that part complete with the errors corrected.

CAPACITY TEST.

Should a wire in a cable become broken, the ends remaining insulated from ground and each other, then a capacity test will be necessary to locate the trouble. Probably the easiest method is to make use of a good wire in the cable same as in the Varley loop test and take a galvanometer reading c on this wire, then another c_1 on the broken wire and a third, c_2, on the good wire with the broken wire joined to it at the farther end. Fig. 25 shows connections for the capacity test. Now let L = length of cable in feet, and x = length of wire in feet to break from the testing end. Then we have $x : L :: c_1 : c_2 - c + c_1$. Where it is evident that the throw on the whole broken wire equals $c_2 - c + c_1$, therefore $x = \frac{Lc_1}{c_2 - c + c_1}$

Suppose for example, that $c = 20$, $c_2 = 25$, $c_1 = 15$, and $L = 1$ mile or 5280 feet, then $x = \frac{5280 \times 15}{25 - 20 + 15} = 3960$ feet, the distance from the exchange to the break.

UTICA HOME COMPANY SCOOPS BELL.

A TEST of the superior service given by the Utica Home Telephone Company was shown Election Day, when its information operators answered a record breaking number of information calls. The Central New York Company (Bell) was of the opinion that the Independent company had made no arrangements whatever to get the election results, and informed the newspapers to the effect that they would be furnished with the news from the surrounding districts with speed and accuracy. The Home Company had expended money and time to get the results from every Oneida County district, and its methods worked very successfully. When telephone subscribers thought it was time to inquire the results of the operator, those who called on the Bell Company could not be furnished for two reasons. One of these is that the company was slow in getting the returns and the other was because they could not compile their figures fast enough. A. H. Smith, of the Home Company, secured extra clerks, and Miss Margaret Keene, the efficient chief operator, added operators to the information bureau, and satisfactory service was given. Between 5 and 9 P. M. the information operators answered 32,000 calls and parceled out the news to the hungry subscribers, eager to learn if their favorite won. The number of calls was a record-breaker. Business men and others, along with the newspapers, became disgusted with the poor service of the Bell concern and relied entirely for their news from the Home company.

SAY THEY CAN TALK ACROSS THE OCEAN.

IT was reported the past week that a method had been discovered by means of which it will be perfectly practicable to talk from New York to London, and by means of the same method it will be possible to telegraph across the ocean at a much more rapid rate than at present. The newspaper correspondent who spread the report claims that these results have already been surpassed and that he is compelled to await the inventor's (who is an Englishman) permission before he can give more definite details. It may be so. Who can tell?

CUTTING TREES BY ELECTRICITY.

IT is reported in the German press that successful experiments have been made in various forests of France in cutting trees by means of electricity. A platinum wire is heated to a white heat by an electric current and used like a saw. In this manner the tree is felled much easier and quicker than in the old way; no sawdust is produced, and the slight carbonization caused by the hot wire acts as a preservative of the wood. The new method is said to require only one-eighth of the time consumed by the old sawing process.

The Editor's Page.

NOTHING SUCCEEDS LIKE SUCCESS.

THE secret purchase by the Bell telephone interests of the Kellogg Switchboard and Supply Company was a plot to secure certain results. If they could have kept secret indefinitely the fact of this purchase a great deal of harm might have resulted to the Independent companies and indirectly to the public at large. It is easy to see what might happen, if the Kellogg Company, with the prestige of its past, should succeed in hoodwinking the public and continue to successfully masquerade as an Independent company. But the secret of the purchase did leak out, and has been quite thoroughly exploited. The Independent operators are in touch with the situation and keenly alive to their own interests in the matter.

There is nothing which succeeds like success. Doubtless had the Boston financiers who control the Bell Company succeeded in fooling the people and in a measure re-establishing their monopoly, the move might have been regarded as a fine piece of business strategy. But its failure must relegate it to a conspicuous position among that great collection of blunders by which the Bell people have been draining their resources during the past few years.

It is an interesting question, how long can they stand this drain and how long can they endure the more scientific competition of the Independent companies? In 1893 and 1894 the first elementary patents owned by the Bell Telephone Company expired. The entire Independent movement dates from that time. At frequent intervals since almost monthly, other patents which had secured a monopoly to the Bell people have been expiring, each expiration giving an added impetus to the Independent movement. Nine years have witnessed the growth of the entire Independent movement, and what a marvelous and significant growth it has been. Prior to 1894 there was not a telephone in a single farmhouse in all Indiana. An offer of $100 for the name of a farmer having a telephone was not taken.

In spite of sand bag methods, chicanery and other frantic and tricky struggling on the part of the Bell people to maintain this monopoly and keep the future of telephony entirely in their control, the Independent operator has invaded, one after another, the strongholds of monopoly, and in many cases has absolutely crushed out Bell competition, until in the middle west, save Illinois alone, there is not a state capital in which the Independent system is not dominant. In a short time this statement can be made of Illinois also. For in Sangamon County the Bell Company has not an exchange in operation outside Springfield, the county seat and the capital of the state, and there a strong competing company is operating. The Bell people have established relations with the rural companies, but the Independent company is taking these away one by one.

INDEPENDENTS WILL NOT BE BLIND.

In Logan and De Witt counties there is not a Bell exchange where there were formerly hundreds of subscribers. Nothing remains but a few toll stations. In Tazewell County the Bell has been reduced to two exchanges, with perhaps five hundred telephones, while the Independents have 2,500. In Pekin, the county seat, where once were five hundred or six hundred Bell subscribers, there are now about 125. In Decatur, Macon County, the Bell Company had a thrifty exchange and the Independents a weakling, and there was no Independent exchange outside the city. Within a year the Bell people sent an agent to buy up the stock of the Independent company there. He succeeded in securing a majority of the capital stock. Then, having accomplished this, they permitted themselves to be outgeneralled. Five directors were to be elected. The minority stockholders "plumped" their votes, divided them equally among three candidates and succeeded in electing them. In other words, the minority stockholders actually succeeded in securing a majority of representation in the directorate. They reorganized the concern, put in a fine underground system, and to-day the company has more telephones in Decatur than has the Bell and has over 2,000 outside the city where the Bell has not an exchange.

THE AMERICAN TELEPHONE JOURNAL cites these facts because they are interesting and because they are significant. They clearly show the trend of events and suggest the future of telephony. With these facts staring investors in the face; with the enormous sums paid out by the Bell people in unsuccessful litigation; with millions of unearned profits to be paid over to the Western Union Company by order of the Supreme Court, is it any wonder that Bell securities have depreciated one-half; that there has been an enormous shrinkage of over $100,000,000?

The Independents have succeeded legitimately. They reduced telephone rates to a reasonable basis; they become local companies, relying on stockholders vitally interested in success, rather than hired agents; they gave better service at a cheaper rate. An increase in capital stock for rebuilding the Bell systems and putting them on a competitive basis cannot undo what has been done and done so thoroughly. The future of telephony rests with the Independent operator. Its logical development is in the direction of Independent local companies. There is no short circuit to success. In the end the fittest must survive and by all the laws of economics the Independents are most fit. Having achieved these things, it is idle to suppose that they will be blind to their future and undo all by placing themselves in the power of a Bell adjunct, whatever its name. The Kellogg Switchboard & Supply Company, notwithstanding its past, must now be regarded as a Bell concern, and as such it will be shunned by all Independent operators.

FOREIGN CURRENTS

By "The Arrester."

A TENDENCY developing among those who plan the English municipal telephone plants, to try to economize in first cost is the subject of a recent editorial in the *Electrician,* and the deduction made is on somewhat original lines. The *Electrician* makes reference to the inauguration of the lately installed municipal telephone exchange at Brighton and remarks that in the establishment of the municipal exchanges so far undertaken, very little regard has been paid to engineering efficiency. The Post Office exchange and the later exchanges of the National Telephone Company represent the the best standards of engineering efficiency, while the municipal exchanges are of a very different order. On the other hand, the *Electrician* thinks that Mr. Bennett has made out a good case for economy of material and in capital expenditure and that as it is doubtful how long the municipal exchanges will last, no one can say that this policy of cheap work is wrong. This may be "writ sarcastic," but it strikes us that the policy of cheap work is one of the chief troubles of municipal telephony in Great Britain.

The Wrath of "Engineering"

THE Glasgow Corporation telephone enterprise has also drawn down upon it the wrath of *Engineering,* one of the weightiest of the technical journals, which seldom pays much attention to telephony. A three-column editorial conveys numerous pointed criticisms of Glasgow municipal finance in general and of the telephone accounts in particular. The omission of any allowance for depreciation is condemned in the most wholesale way and the Glasgow Council is reproached with following a "dangerous and foolish policy" in financial matters. The trouble is, thinks *Engineering,* that if depreciation were paid there would be no "surplus" to carry forward, and the citizens would see the telephone enterprise as it really is—a concern carried on at a loss to the community for the benefit of some 9,000 citizens, who get telephones at unprofitable rates, and for the glorification of the local authority. This is rather straight talk, but there is some straighter still, which we quote in full.

An Old Dodge

"ONE councillor who supported the Committee was simple enough to give away the whole case in one sentence. 'He agreed'—so runs the report—'that a larger sum would have to be provided, but they were not going to provide it by throttling the concern.' That truthful remark let the cat out of the bag. If proper payments were made to depreciation and sinking fund, the telephone rates would have to be increased. An increase of these would mean the loss of present clients and the withdrawal of many applications which are now before the department. There would, therefore, be a serious check to progress—nay, there might even be a 'throttling' of the concern. Depreciation must therefore wait until circumstances permit of its being openly recognized, if that day should ever come. This is an old dodge, practised a few years ago in Glasgow by the Electricity Committee, and now handed on to this new department."

The Electrical Tapley

MEANWHILE, at the same time that *Engineering* and the *Electrical Review* are pouring hot shot into the telephone accounts and methods of the Glasgow Corporation, that optimistic journal, the *Electrical Times,* takes quite a Mark Tapleyan view of the situation. This is what the *Electrical Times* has to say of Glasgow's telephones: "After meeting all expenditures there was a surplus (for the year ending May 31, 1903) of $8,470, which, with the previous year's surplus of $1,990, made a total of $10,460. This it was proposed to carry to a general reserve fund. Up to the end of the year (31st May) there were connected 9,122 instruments. While the Corporation had been able to produce a net balance of $10,000 on the right side, the G. P. O. in London had a balance of $30,825 to meet interest, sinking fund and so forth, and its capital was $5,562,500. He (the chairman of the committee) thought, therefore, that the G. P. O. might well go to Glasgow and learn a wrinkle or two from the Telephone Committee. One misguided councillor regarded the accounts as unsatisfactory and misleading, and wanted them referred back, but his amendment was lost. There is not much doubt but the publication of these Glasgow telephone accounts will give an excellent and strong impetus to the municipal telephone movement, towards which the attitude of many large corporations is that described in politics as 'sitting on the fence.'"

THE PROSPEROUS STARK COUNTY CO.

THAT it is not necessary to look to the large cities for progress telephonic, is forcibly evinced when attention is drawn to Canton, Ohio, in which the Stark County Telephone Company, one of the Federal properties, operates. This company owns its own building in which is located an exchange with 2,537 local subscribers, which cannot be excelled in points of service or operation. It also owns a prosperous exchange of 800 subscribers in Alliance, Ohio. One of the salient features of the Canton plant, is a ten-horse-power gas engine, direct connected to a 115-volt generator, which furnishes current to operate all the lights in the building as well as to run charging couples and ringing motor generators for a cost of about $10 per month.

The Stark County Telephone Company commenced giving service March 1st, 1902 and ever since the opening, it has enjoyed the confidence and hearty support of the Canton public, and that such confidence is still enjoyed is proven by the fact that the list of subscribers has shown an increase from 1,900 to 2,500 in the past six weeks, and contracts are being secured at the rate of twenty per day. The physicians and druggists, eighty-two in number, formed a voluntary combination among themselves, April 1st, 1902, whereby the Stark County Telephone Company's service is used exclusively; thus the Central Union Co., is most effectually crippled, not having connection with a doctor or druggist in the city. A new section of switchboard, about nine miles of additional cable and a selective signal party line system have been recently installed, increasing the capacity of the exchange to four thousand. General manager, A. S. Hillhouse, states that the three thousand mark will be reached, without doubt, by January 1st, 1904. Morton Perdue, formerly connected for a number of years with the Bell company, is superintendent of the Stark Company.

EUROPEAN RAILWAY TELEPHONES.

THE electric lines north of Milan, worked by the Mediterranean Company on the third-rail system, with high-tension overhead feeders, require a telephone service as auxiliary to the telegraphs for working the traffic. As the telephone wires are carried on the same poles as the high-tension feeders, great precautions were necessary to ensure proper working and to prevent accidents. Three telephone wires are run throughout, but as it was desired to be able to use any one of them alone with earth return, the high-tension feeders were twisted three times in each of three sections. To avoid risks from contacts between the telephone wires and the high-tension feeders all instruments are connected through transformers with earthed shields between the primary and secondary windings.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

CONDUCTION, INDUCTION AND CONTACT.

WILL you kindly explain in the columns of the JOURNAL the rights of a telephone company as to interference with its lines by the wires of an electric street railway company? We have had some trouble in the town in which we operate with the street railway company, and will appreciate any information you can give. F. T. R.

THE courts have found that interference between the lines of different electric companies takes place in three ways, (*a*) by induction, (*b*) by conduction and (*c*) by contact. By an electrical law, the transmission of a powerful current of electricity, such as is used by a street railway company to propel its cars, along a line of wire parallel with and in close proximity to a wire carrying a weak current, such as the line of a telephone company carries, induces upon the latter an additional current which greatly disturbs the operation of the telephone system. This is interference by induction. Interference by conduction is caused by the flow of electric current from the rails of the street railway into the ground from whence it spreads by reason of the conductivity of the earth to the grounded wires of the telephone company and causes serious disturbance to the latter. Interference by actual contact of wires needs no further definition. In each of these cases the rules of law differ.

At the bottom of the distinction made between the rights of these companies in these three different cases is the principle that the primary and dominant use of a street is for public passage; that when the abutting owners surrendered their land that forms the street, they gave it up for the purpose of travel. The use of a street for a street railway is held to be in accordance with the purpose for which the street was originally dedicated. Its use by a telephone company is held to be far beyond that purpose. The courts therefore hold that a street railway has a right to be in the street and if induction from its wires interferes with the operation of the telephone system it is not the fault of the street railway company and can only be prevented by the telephone company moving its wires or establishing guard wires.

The principal of dominant use does not apply in the same way to interference by conduction. The interference in this case is not caused by the telephone company's occupation of the public streets. By analogy to the rule that a person cannot discharge upon another's lands such a quantity of water as will inundate them and destroy his property, courts have decided that one cannot discharge electric current into the ground in such strength that it will be conveyed to the lands of his neighbor and, acting through his grounded wires, break up his business. It is the duty of the one using the more powerful current in this case to provide an artificial path for the electric current, if necessary to prevent injury to others.

The rule as to contact is that the company last in the field must guard against it. On the whole subject see Hudson River Telephone Co. v. Ry. Co., 135 N. Y. 393, 4 Am. Elec. Cas. 276; State ex rel. v. Ry. Co., 87 Wis. 72, 4 Am. Elec. Cas. 289; Cumberland Teleg. & Teleph. Co. v. United Elec. Ry. Co., 93 Tenn. 492, 4 Am. Elec. Cas. 297.

REGULATE DOES NOT MEAN PROHIBIT.

THE district court of Sedgwick county, Kan., has decided that the city of Wichita has no power to prohibit a telephone company from entering the city. The city of Wichita brought suit against the Missouri and Kansas Telephone Company for a permanent injunction to prevent the company from improving and repairing its plant and to oust it finally from the city. The case was decided upon demurrer.

Three questions arose. First, whether a franchise granted to defendant had been terminated by the action of the council. Second, whether the chapter of the State laws providing for the formation of telephone companies and conferring upon them all the powers of telegraph companies was constitutional; telegraph companies having power "to set their poles, piers, abutments, wires and other fixtures, along, upon and across any public roads, streets and waters of this State in such manner as not to incommode the public in the use of such roads, streets and waters." And third, whether the subdivision of the city charter act, granting power to the mayor and council to grant the right of way for the erection of telegraph and telephone poles and wires upon any streets of the city and change, modify and regulate the same, was broad enough to give cities the right to refuse telephone and telegraph companies any rights in cities without a franchise.

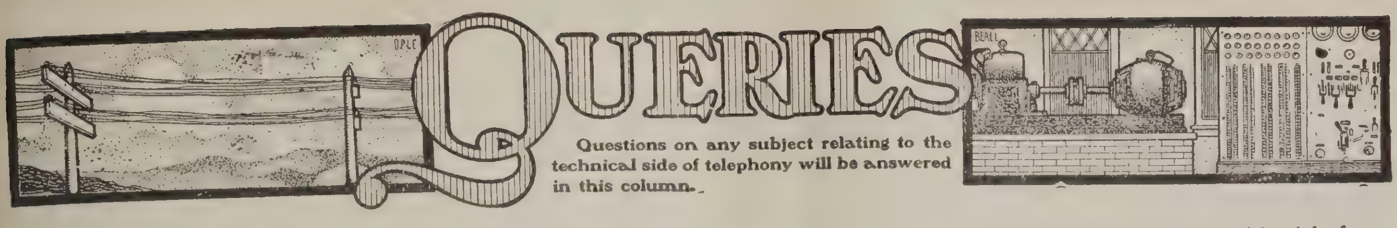
The decision of the first question, said the court, was made unnecessary by the decision of the other two. Upon the second question the court held the act constitutional in spite of the objection that its purposes were not properly expressed in its title and that the act purported to convey power by reference only. The section of the city charter act, the court held, was not intended to confer upon the council the right claimed; its purpose was to give power to the city to enter into contracts with incoming companies. Neither did the section conflict with the provisions of the State law relating to telegraph companies. While the council might reasonably determine what streets or alleys might be used and in other ways regulate their use, it could in no instance absolutely prohibit the use of all streets and alleys by the company. City of Wichita v. Missouri & Kansas Telephone Co., District Court, Sedgwick Co., Kan.

DOWIE IN A TELEPHONE SUIT.

WHILE John Alexander Dowie is exercising every effort to save the wicked and ungodly of New York and "spanking" the local press, the law firm of Moran, Mayer & Meyer will prosecute for him his suit against the Chicago Telephone Company before Justice Martin. The object of the suit is the recovery of money alleged to have been paid the telephone company for telephone service in Zion Building, Twelfth Street and Michigan Avenue, in excess of the rate permitted by a city ordinance. The demand is for $200.

VALIDITY OF FRANCHISE.

THE Supreme Court of New Jersey has granted an order to show cause why a writ of certiorari should not be granted for a review of the franchise given to the New York and New Jersey Telephone Company by the common council. It is contended that the ordinance is invalid because two years had elapsed between the time the ordinance was introduced and the date of its final passage. The legality of the ordinance is also questioned because, it is claimed, two members of the council who voted for the measure on its first and second readings were not members of the council when it was finally passed.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

SWITCHBOARD POSITION.—(234.)

What does the word "position" mean when applied to a switchboard?

P. M. B.

Every switchboard may be considered to be made up of exactly similar yet entirely distinct units, each unit being that amount of apparatus necessary to the vocations of one single operator. Such a unit is called a "position."

ANTI-SIDE TONE OPERATOR'S CIRCUIT.—(235.)

Some telephone companies are installing in their switchboards in their operators' circuits what are called anti-side tone devices. Can you give me the circuit of one of these and explain its action?

S. L. J.

The Anti-side Tone Operator's Circuit to which you refer is shown in the accompanying drawing. The operator's induction coil consists of a specially wound coil in which the primary winding is divided into two parts, these parts being connected in parallel in the circuit, as shown. The secondary winding, also, consists of two parts which are connected in series as illustrated in the Fig. (235). A non-inductive resistance of about 30 ohms is inserted in one side of the secondary circuit leading to the listening key and a 2-M. F. condenser is connected in series in the other side. The operator's receiver is connected as illustrated in the diagram, so that it forms a shunt around one of the secondary windings of the induction coil and the non-inductive resistance. A retardation coil of about 120 ohms resistance is inserted in series between the transmitter and the battery, in the usual way. The effect of this arrangement is as follows: By dividing the primary winding into two parts and connecting them in parallel, the impedance of this part of the coil is reduced by one-half. This follows from the fact that the impedance of a coil is proportional to the square of its turns, as assuming, for example, that the primary winding consists of four turns, then the factor due the number of turns which enters into the expression for the impedance will be equal to four squared, or sixteen; when, however, the primary is divided into two parts, each part having two turns, the factor in the expression for the impedance due to the turns will be represented by twice two squared, or eight, and thus it will be readily apparent that the impedance is halved. The mutual induction between the primary and secondary windings of the coil is proportional to the number of turns, and hence is not changed by dividing the primary winding into two parts. The effect of connecting the receiver as a shunt around one-half of the secondary coil is to subject it to half of the electromotive force generated in the secondary winding. The non-inductive resistance serves to reduce the current flowing through the receiver, due to the impressed voltage of half the secondary, and hence the effect of the circuit is to render the transmitter more sensitive than usual and to decrease the sensitiveness of the receiver, and in this way the side tone effect is reduced.

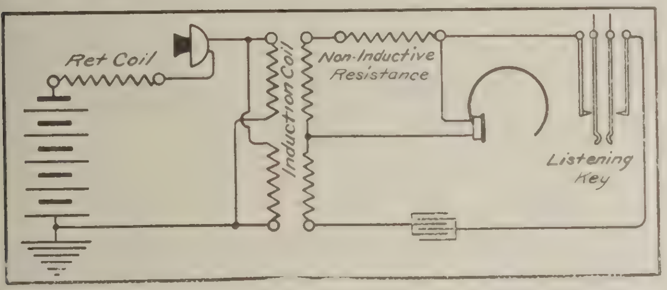


Fig. 235.

OPERATOR'S LOAD.—(236.)

About how many calls should an operator handle in a day?

C. S. P.

On modern switchboards an "A" position should handle from 1,600 to 2,000 messages a day. A "B" position from 2,400 to 3,000 messages. On a magneto board a fair "A" position load is from 1,100 to 1,300 messages, and for a "B" position from 1,900 to 2,100.

A CAPACITY TEST QUESTION.—(237.)

Please show me how you get the proportion $\frac{X}{L} = \frac{C_1}{C_1 + C_2 - C}$, where X is the distance of the break in the wire from the testing station, L the total distance to the end of the line and the Cs denote the capacities of portions of wire indicated in Fig. 237.

Will you please tell me why in making a capacity test with the apparatus indicated in order to locate an open you use the equation $\frac{X}{L} = \frac{C_1}{C_1 + C_2 - C}$

Would not $\frac{X}{L} = \frac{C_1}{C}$ do just as well?.

R. C. A.

Every expression of equality between two fractions may be written as a proportion and the preceding equation may stand: $X : C_1 :: L : C_1 + C_2 - C$. X and L are respectively distances from the point G (Fig. 237), to the break in the conductor and the entire length of the line, C_1 is the capacity from G to the break, while $C_1 + C_2 - C$ is, as a very little inspection will show, the capacity of that portion of the conductor from the break to the remote end. The measurements to be made in this case consist, first, in measuring the capacity of X from the pointG which is represented by C_1, then in measuring the capacity C which is that of another conductor from G to the remote end of the line. Lastly the capacity formed by looping conductor C to the remote end of the faulty conductor, and measuring the capacity from G back to the break which is represented by $C + C_3$. From the data thus obtained the preceding proportion or equation is at once calculated. The object of all this is to secure greater accuracy. At best, capacity measurements are somewhat difficult, and are liable to greater errors than measurements of resistance. If the capacity per unit of length of the broken conductor was known, it would be possible to determine the distance X simply by measuring the capacity of X. For example, an ordinary cable conductor has a capacity of about .080 M per mile. If a measurement were made upon the wire X the capacity of .040 M were found, the experimenter would be reasonably sure that the break was about half a mile from the testing point. In many cases, however, the capacity per unit length is not known, and therefore such measurements must be made as will determine this quantity. If we know the length L of the entire conductor, and we know the capacity of both pieces, we can, obviously, calculate the capacity per unit length. Therefore, by means of the conductor C it is possible to measure the capacity of both pieces of the broken conductor, and therefrom derive the capacity per unit of length and so locate the break. Again, by making two capacity measurements at each part of the broken conductor, greater accuracy is secured, and if errors are introduced they are more likely to be discovered by such check measurements.

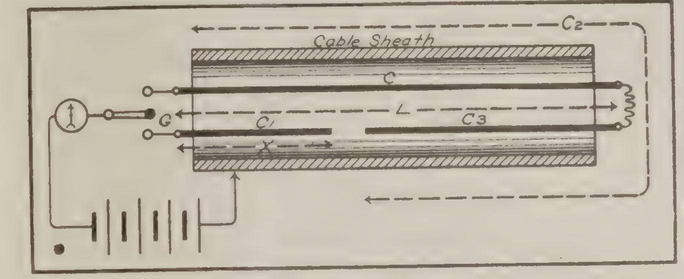


Fig. 237.

TELEPHONE CENTER.—(238.)

What is meant by the telephonic center of a town?

D. T. S.

The telephonic center of a town is that point within any group of subscribers from which the sum of the distances measured along streets to all sub-stations is a minimum.

PATENTS ISSUED

AUTOMATIC TELEPHONE SYSTEM.

M. C. Rorty and A. M. Bullard are granted patent (No. 743,564). This is for an improved automatic telephone exchange. This patent is a voluminous one containing four sheets of drawings and twelve pages of specifications and it is impossible to do justice to it in the abstract. The principles of the inventors are illustrated in Fig. 1, showing the circuit, and in Fig. 10, showing subscribers' instrument. The principle involved is that of step by step selective devices. At the sub-station there is a dial having a series of numbers corresponding to all other subscribers. A lever is arranged to move over the dial making contact with each number. This operates on an electro magnetic mechanism at the exchange and each contact of the dial arm moves a selector arm until this arm picks out the desired subscriber. Provision is made for a busy test, and for ringing the subscriber. The general circuits are shown in Fig. 1, and can be easily traced, while those who are interested in this subject would do well to secure a copy of the patent.

Fig. 1

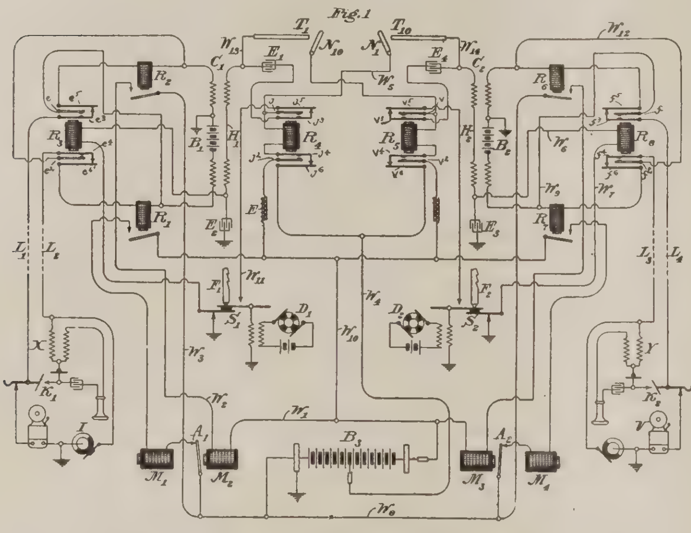
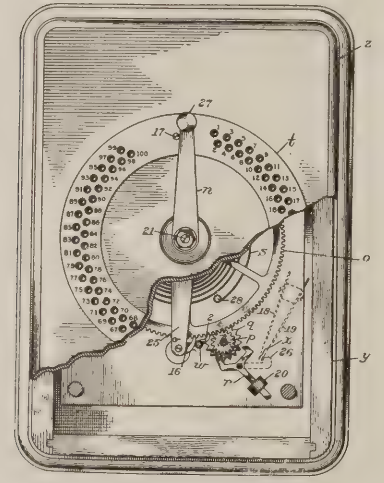


Fig. 10



IMPROVEMENT IN TRANSMITTERS.

Albert Stromberg, of Chicago, patents (No. 743,951) and assigns to the Stromberg-Carlson Telephone Mfg. Company, an improvement in transmitters. This is an improvement in the method of securing the electrode chamber to the diaphragm, and is described by the inventor as follows: Many transmitters heretofore proposed have provided an electrode chamber mounted upon and carried by the diaphragm, but as heretofore constructed such chambers have braced the diaphragm or prevented its free vibration. It is one of the features of my invention that while I mount the electrode chamber upon the diaphragm, it is so arranged as to be perfectly free. Figs. 2, 3, and 4 show the essence of this invention. Fig. 2 is a section and Fig. 4 shows the individual parts. The essential feature consists of an electrode chamber *14* that is arranged to be inserted in a hole in the diaphragm *8*, and secured thereto by means of a thread washer cut on the exterior of the chamber. In Fig. 3 the diaphragm and electrode chamber are assembled from which the general arrangement is so obvious as to render further description superfluous.

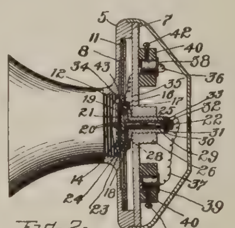


Fig-2-

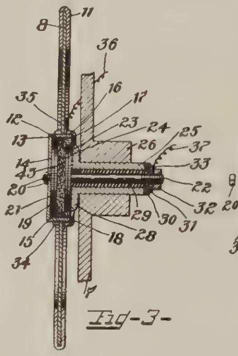


Fig-3-

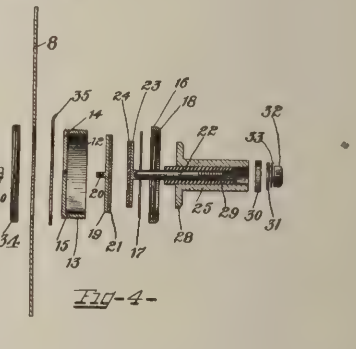
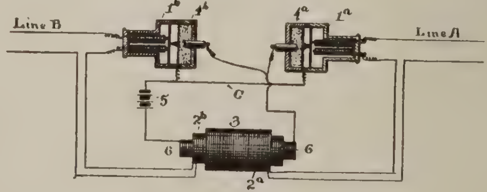


Fig-4-

TELEPHONE RELAY.

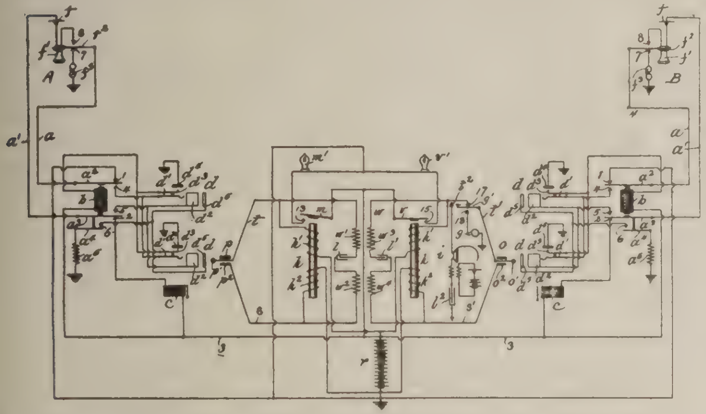
Gus. A. Sundquist, of Cleveland, Ohio, patents (No. 743,589) and assigns one-half to A. H. Wahl of Cleveland, an improved telephone relay. This invention is shown in the accompanying illustration, in which *4a*, *4b* are two transmitters, *1a* and *1b* two receivers, *A* and *B* two telephone wires, *3* an induction coil with three windings. The circuit through the relay may be traced as follows: Assuming that the message is received from line *A* for transmission over line *B*, the sound-producing undulations enter on line-circuit *A*, pass through the receiver *1a* and the secondary *2a*, and thence return by the metallic circuit or to ground. The secondary *2a* influences the secondary *2b*, inducing talking-currents therein of equal strength to those received, while the receiver *1a* transmits the vibrations occasioned therein directly to the microphone *4a*, causing corresponding undulations in the pri-



mary circuit, including the primary coil and the primary battery. The current thus produced in the primary circuit induces in the secondary coil *2a* talking-currents of the desired intensity, which are transmitted over the line *B*, as will be readily understood. The symmetrical arrangement of parts permits the relay to operate from either side, so when voice currents are sent over the line *B* they pass through receiver *1b* and the secondary *2b*, and thence to return, and the secondary *2b* induces currents in the secondary *2a*, while the receiver *1b* transmits vibrations to the microphone *4b*, causing corresponding undulations in the primary of the induction-coil.

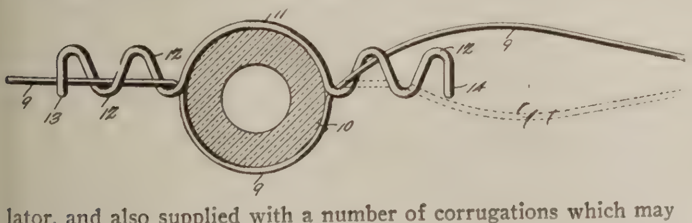
COMMON BATTERY SWITCHBOARD CIRCUIT.

Wm. A. Taylor, of Chicago, Ill., patents (No. 743,953) and assigns to the Kellogg Switchboard & Supply Company an improved common battery switchboard circuit. This invention is shown in the figure. Its essential features are as follows: At *A* and *B* there are two substations of the ordinary common battery variety. The central office is provided with a jack *d* and a cut-off relay *b*, line relay *c*, and a common battery *r*. The cord circuit is provided with two supervisory relays *h* and *k*, which are differentially wound. There is also a repeating coil with four windings *w1, w2, w3* and *w4*. This coil is opened at *1* and *1'* by condensers. A little inspection will show that this circuit strongly resembles in many particulars several common battery circuits patented by the Kellogg Company. In a general way the subscriber calls by removing his telephone from the hook, which actuates the signal. When the operator plugs in the cut-off relay is operated and the signal is removed. Battery is then supplied by the cord through the coils *h* and *k*. As these are differentially wound the supervisory signals *m'* and *v'* are not operated as long as the subscribers' receivers are off their hooks, because battery current is flowing in both directions and the coils *h* and *k* are therefore not magnetized. When the receivers are replaced, current flows in one direction and the supervisory signals are operated.



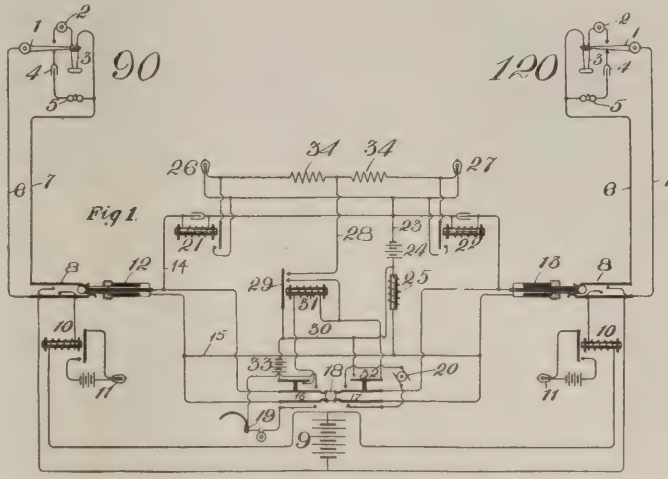
TELEPHONE TIE WIRE.

George F. Moore, of Mobile, Ala., patents (No. 742,890) an improvement in tie wires for aerial lines. This invention is illustrated in the figure. The inventor provides a tie wire *12*, which, by means of a die or other apparatus, is formed to fit the insulator, and also supplied with a number of corrugations which may be easily strung over the line wire, thus securing the line wire to the insulator without the necessity of twisting the tie wire around the line wire.



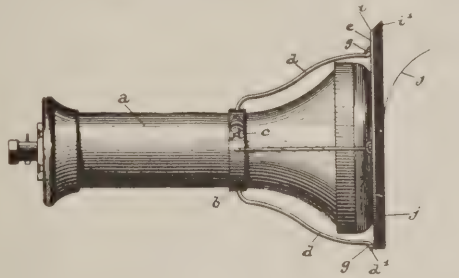
IMPROVED SWITCHBOARD CIRCUIT.

G. L. Cragg is granted a patent (No. 743,457) for an improved switchboard circuit. This is shown in the accompanying illustration. The circuit at the sub-station and the subscribers' calling circuit is the same as that used by the Stromberg-Carlson Mfg. Company. In the cord circuit, however, there is a relay, *29*; when this relay is excited it closes the contacts through conductor *28*; this conductor supplies the supervisory lamps and consequently these lamps do not burn unless the relay contacts at *29* are closed. These contacts are operated by ringing key and listening key *16* and *17*. When subscribers hang up the receivers the supervisory lamps are lighted and indicate to the operator that conversation is completed. When the operator sees these lamps, she presses the listening key *18*, and this opens the relay circuit and extinguishes the supervisory lamps.



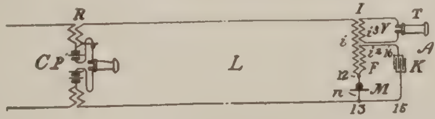
ANTISEPTIC APPARATUS FOR TELEPHONES.

Abraham Levi, of Baltimore, Md., patents (No. 743,896) and assigns two-thirds to Louis Levi and Max Levi. This is a device for an improved antiseptic device to be attached to telephone apparatus. It is illustrated in the figure. The inventor provides a wire frame which may be clamped upon the receiver as shown. This wire frame is arranged to support a number of sheets of antiseptic paper or other similar material which is placed over the mouth piece. Every time that the receiver or transmitter is used the speaker may tear off one of the strips of paper and throw it away, and thus the apparatus is protected.



IMPROVEMENTS IN SUBSTATION APPARATUS.

George Thompson, of Newton, Mass., patents (No. 743,594) and assigns to the American Telephone & Telegraph Company, an improved induction coil. Mr. Thompson's invention relates to improvements in induction coils whereby the side tone in common battery instruments may be avoided. Mr. Thompson shows in his patent a number of different arrangements. The one in the figure shown is, however, sufficient to explain the general principle. There is a peculiarly wound induction coil *i* having three windings *i, i2* and *i3*. The winding *i* forms what is usually known in common battery circuits as the secondary of the coil. The windings *i2* and *i3* are separate and independent primaries. The receiver is placed in *i3*. It is obvious that *i3* may be made as large or as small a fraction of the coil as may be desired, and thus the side tone in the receiver may be reduced to any desired amount.



The Week's Messages.

FINANCIAL

WAYLAND, IA.—The Wayland Telephone Company has increased its capital stock to $12,000.

WOODBINE, IA.—The Woodbine Telephone Company has filed amended articles of incorporation increasing its capital stock from $25,000 to $50,000.

CRETE, NEB.—An ordinance has been introduced into the city council imposing an occupation tax of $200 on telephone companies doing business in this city. This is considered as being an attempt to keep out both the two Independent companies that are endeavoring to get into the city.

WAYNESBURG, PA.—The South Penn Telephone and Telegraph Company, of Waynesburg, has declared an initial dividend of 4 per cent. of its earnings for the past six months.

FRANCHISES

DALE, CAL.—The county supervisors have granted a franchise to the Dale Telephone Company for the construction of a line from Dale to Amboy.

OTTAWA, CANADA.—The Merchants Telephone Company of Montreal is preparing to make an offer to Ottawa in order to obtain a franchise.

NASHVILLE, ILL.—A franchise has been granted the Rixman Telephone Company of Irvington to operate a telephone system in this city.

WASHINGTON, ILL.—The Washington City Rural Telephone Company has been granted a franchise to construct and operate a local system.

MASON CITY, IA.—Citizens of this place have voted in favor of granting a franchise to J. Van Valkenberg.

EASTPORT, ME.—The city council has voted to allow the franchise granted to the Lakeside Telephone & Telegraph Company to be transferred to the Forrest Telephone & Telegraph Company. Dr. A. Brehault is the president of the latter company.

DETROIT, MICH.—N. W. Harris and associates, who have purchased the Michigan Telephone Company, state that they will not abandon the efforts made some time ago by Don M. Dickinson to secure a new franchise from the city. The Boston *News* is authority for the statement that the Michigan Telephone Company will be reorganized by the bondholders' protective committee and a new company formed under the laws of the state of Michigan.

MOORESTOWN, N. J.—The township committee has passed the ordinance granting the Farmers Telephone & Telegraph Company the right to erect poles in the township.

FARGO, N. D.—P. H. Lamb, L. H. Baker, and Leslie Welter have petitioned the city council of Moorehead for a telephone franchise.

MICHIGAN, N. D.—The city council has granted a franchise to Edward Litton for the purpose of constructing and operating a local telephone system.

PONCA CITY, OKLA.—The Reservation Telephone Company has been granted a franchise to build and operate a telephone line between the Ponca Indian Agency and a number of surrounding towns. Its capital stock is $5,000.

NEW BRIGHTON, PA.—An ordinance granting a franchise to the Beaver County Telephone Company of Beaver Falls, has passed first reading in the city council.

GREEN BAY, WIS.—The application of the Valley Telephone and Telegraph Company for a franchise in this city has been referred to the committee on ordinances.

WAUSAUKEE, WIS.—The Wausaukee Telephone Company has asked for a franchise to put in a system at Pastigo. The application will, in all probability, be granted.

COMBINATIONS

DAWSON, GA.—W. W. Collier has purchased the Dawson and Bainbridge systems of the Georgia and Alabama Telephone Company.

GREENBURY, IND.—The Decatur County Independent Telephone Company has absorbed the Westport and Sardinia Telephone Company, and will operate that line through the local exchange.

BOONE, IA.—The Boone County Telephone Company has purchased the system of the Ogden Telephone Company at Ogden, adding about 400 subscribers to its list.

ABILENE, KAN.—W. A. Matteson has moved to Cherryvale, Kan., where he has purchased the telephone exchange, which he will operate himself.

LIMA, OHIO.—The Lima capitalists have purchased the interests of the Federal Telephone Company in the local and county telephone systems, paying par value for the block of $40,0000 worth of stock.

GROTON, VT.—Everett Foresyth has sold his telephone line to Hatch and Blodgett. The line extends from East Bradford to West Bradford and West Topsham and from East Corinth to Topsham. Drs. Hatch and Blodgett own a line in town and contemplate constructing a line between Groton and Topsham.

RATES

GALESBURG, ILL.—By a vote of 9 to 5 the Galesburg city council voted in favor of an ordinance granting the Galesburg Union Telephone Company the right of advanced rates on some 600 telephones.

ELECTIONS

HARTFORD, CONN.—At the annual meeting of the Grey Telephone Substation Company the following directors were elected: Amos Whitney, president; Franklin Clark, Frank C. Summer, Francis C. Pratt, H. R. Mills, Chas. Soby, secretary and treasurer, and Lewis S. Caswell.

CUBA, ILL.—The Cuba Telephone Company has elected the following officers: J. C. Rowden, president; J. O. Appleby, secretary and general factotum; and Joseph Bean, Chas. Tink, and O. R. Brady, trustees. It was decided to order a new switchboard at once.

MONROE, N. C.—The stockholders of the Union Telephone Company held a meeting recently and elected directors and John A. Austin, general manager. The work of constructing the exchange and lines will soon be commenced.

ELMORE, OHIO.—The stockholders of the New Ottawa County Telephone Company, which has its headquarters here, held a meeting recently and declared the usual semi-annual dividend. The old board of directors were re-elected.

SUSQUEHANNA, PA.—At the annual meeting of the Susquehanna Telephone Company the following directors were elected: M. H. Tisman, E. W. Jackson, Dr. S. S. Simmons, M. J. Lannox and Frank Zeller.

RUTLAND, VT.—The Green Mountain Telephone & Telegraph Company held its meeting here recently and elected the following officers: C. F. Wooley, president; C. W. Wooley, vice-president; A. C. Gibson, secretary; E. L. Walker, treasurer; W. E. L. Walker, manager.

PERSONAL

G. B. ANDERSON, who has been superintending the construction work at Joplin, Mo., for the Bell Telephone Company, has been transferred to Pittsburg, Kan.

W. F. CROSSLEY, who has been in Salem, Ohio, for three years general manager of the Columbiana County Telephone Company, was appointed general manager of the Youngstown Telephone Company, in addition to having charge of the plant at Salem. The change virtually makes a district of the Salem and Youngstown plants. The Youngstown office has been considered the next in importance to the Cleveland office. Mr. Crossley succeeds Charles Y. McVey, who has been in charge of the Youngstown plant for four years.

JAMES F. CUMMINGS, formerly of 26 Cortlandt street, New York, is now in St. Petersburg, Russia, superintending the laying of Yankee conduit for the Municipal Telephone & Telegraph lines of the Muscovite capital. He has employed over 2,000 Russians to carry out the work.

GEORGE D. FOOTE, for several years with the Southern N. E. Telephone Company at New Haven, Conn., has become general manager of the Consolidated Telephone Company, with headquarters at **Danville, Ind.**

MANAGER GRAHAM, of the Telluride (Colo.) Telephone Exchange, has resigned and will locate at Durango as manager of the telephone business of that place.

W. L. HASKELL, of Springfield, Ohio, has accepted the position of manager for the Minnesota Valley Telephone and Telegraph Company, which has its offices at Mankato, Minn.

H. B. HEWITT, salesman in Missouri for the Stromberg-Carlson Company, who was permanently located at Keithsburg, Ill., has moved to Chillicothe, Mo. In a recent number an announcement concerning Mr. Hewitt's change of address was made which was incorrect. This repetition is made to correct the error.

GEORGE ARTHUR JACKSON, cashier for the Utica Home Telephone Company, Utica, N. Y., is to be married to Miss Elizabeth Hurley of Utica. The ceremony will take place Wednesday, November 25th, at 8 P. M. Mr. Jackson was for some time connected with the Home plant at Louisville, Ky.

MISS MARGARET KEAN, who has been the chief operator for the Utica Home Telephone Company at Utica, N. Y., for the past six months, has resigned to accept a position with Barber & Braley, of Toledo, Ohio. She will be located after November 21 at Springfield, O. Her successor at Utica will be Miss M. Magee, who has been acting as monitor for some time. Miss Kean was esteemed for her ability by the Utica management and her departure is regretted by many. Her successor, hawever, has won her position by diligence to her work and is competent to perform the duties of chief operator. Miss Kean will act as assistant to Mrs. H. Brown, traveling chief operator for the Barber & Braley concern.

MR. G. W. LEYDA, formerly connected with the Bell and Independent companies at Rock Island, Ill., and Davenport, Ia., has taken the full charge of the Evansville (Wis.) telephone exchange, to which place he has moved his family.

F. W. PARDEE, corresponding secretary of the Chicago Writing Machine Company, manufacturer of the Adjustaphone, has left for St. Louis to arrange for the company's exhibit of Adjustaphones and other telephonic apparatus at the coming exposition. He will also transact other business with St. Louis electrical houses while he is in the city.

THEODORE E. PARKER, of New Bedford Mass., superintendent of the Southern Massachusetts Telephone Company, is announced as engaged to Miss Harriet Talbot.

FRANK SLOUGH, JR., formerly connected with the trouble department of the Mansfield (Ohio) Telephone Company, and who has recently been connected with the Federal Telephone Company at Fremont, O., has been appointed to the position of wire chief of that department.

CHAS. F. SPEED, who has been sales manager for the American Electric Telephone Company of Chicago, has resigned and will take charge of the telephone exchange at Ann Arbor, Mich.

CHARLES E. SUMNER has returned to Toledo, Ohio, from a sojourn in California. He expects to return with his family and remain at San Diego for a year or more. He will superintend the construction of the new Independent telephone plant there.

A. H. VOREUM, connected with the St. Paul (Minn.) exchange of the Northwestern Telephone Company, is to be transferred to St. Cloud, Minn., to take complete charge of the board and equipment being installed.

E. W. MOORE, of the Everett-Moore syndicate, was in New York several days last week.

MR. AND MRS. A. N. WALSTAD, of Minneapolis, Minn., have gone to Seattle, Wash., where Mr. Walstad goes to take a position with the Independent Telephone Company.

MISCELLANEOUS

ALICE, IND.—The local exchange of the Knox County Telephone Company was burned to the ground recently. It is now temporarily installed in another building but it is probable that it will have to be rebuilt.

MEDICINE LODGE, KAN.—Lightning struck the wires of the Medicine Lodge Telephone Company and burned out their exchange, which was completely destroyed.

HENDERSON, KY.—The plant of the Henderson Independent Telephone Company was damaged to the extent of several hundred dollars from contact with a live electric wire. Severel sections of the switchboard were destroyed and the building damaged.

CINCINNATI, OHIO.—The name of the local Bell telephone company has been changed to "The Cincinnati and Suburban Bell Telephone Company."

UNDERGROUND

RICHMOND, IND.—The city council is considering an ordinance which, if passed, would compel the telephone companies operating here to put their wires in the business section of the city underground.

RICHMOND, IND.—A legal battle is threatened because of a resolution passed by the city council requiring telephone and other electric wires to be put underground on the principal streets of the city. Two telephone, two telegraph and two electric light companies are affected by the order. They will refuse to obey the order and will carry the case to the courts to see if their franchise can be changed or revoked, as the city threatens, if the order is not complied with.

EASTPORT, ME.—The Independent telephone line is being constructed between Eastport and Bellfast. The lines between Bellfast and Pitchers Pond will be completed this winter.

FARMINGTON, MICH.—Charles Bartlett, of Pontiac, addressed the Farmington Farmers Club on the subject of rural telephones. He advised the residents of Farmington to put in a system, and the members of the club were much interested. It is probable that a company will be organized and a system constructed.

GRAND RAPIDS, MICH.—The board of directors of the Citizens Telephone Company held a meeting at Jackson recently, and decided on the construction of a great many more lines.

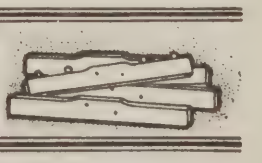
SALEM, N. J.—The Salem city council has granted the Interstate Telephone Company permission to lay its wires underground in the business districts.

JOHNSTOWN, N. Y.—The Glen Telephone Company will construct a line between Tribes Hill and Fort Hunter.

TOLEDO, OHIO.—The city council will insist that the telephone companies to place their wires on Canton street in underground conduits.

HILLSIDE, WIS.—G. H. Zandtke, of the Hillside creamery, is constructing a new telephone line from Utica to Rockdale.

New Construction in the Field



OTTAWA, CANADA.—The organization of the Canadian Telephone and Telegraph Company, which was chartered by the Dominion Parliament, with a capital stock of $1,000,000, has been completed. The headquarters will be in Ottawa and if the company can get a franchise from the council it will begin the construction of its system immediately.

ROSWELL, IDAHO.—The Roswell Telephone Company has completed its line to Parma. The work of constructing was in charge of Samuel Tuing and Charlie Payne.

LINCOLN, ILL.—The Central Illinois Telephone & Telegraph Company has a force of men surveying a right-of-way for a through telephone line from Lincoln to Bloomington.

PEORIA, ILL.—Arthur Hecker has gone to Hopedale, where he will install a new telephone exchange.

ROCKFORD, ILL.—The new exchange of the Winnebago County Telephone Company at Rockton will soon be completed. The exchange will have 75 subscribers to start with.

SHELBYVILLE, IND.—The exchange of the Mutual Telephone Company of this city has been closed to subscribers for a week to make repairs, the tapes having all been eaten away by mice. A new lightning arrester and distributing board is being put in and also a new drop switchboard of increased capacity.

SOUTH BEND, IND.—The South Bend Home Telephone Company has opened a new exchange in North Liberty with about thirty telephones. New rural lines are being constructed in German township connecting about forty farmers with the South Bend exchange. A metallic toll line is to be constructed between Bremen and Plymouth, Ind. The October report of the company shows a net increase of 50 telephones

MAYSVILLE, KY.—Col. J. W. Chambers, of the Maysville Telephone system, was at Owingsville recently to see about installing an Independent telephone system at that place.

BOSTON, MASS.—The North River Telephone exchange, of 96 Maywood street, Boston, has secured a franchise for the construction of a telephone line between Hanover and Norwell, and it is said that the line will be constructed in the near future.

ALBERT LEA, MINN.—Arrangements are being made by the Albert Lea Telephone Company whereby the local farm lines will be connected to its exchange and to operate from the same office.

MORA, MINN.—The Maple Leaf Telephone Company is extending and improving its plant in this village.

NELSONVILLE, N. J.—The Farmers Telephone Company has extended its line to Nelsonville and Allentown and Inlayston. It is expected to extend the line to Clarkesburg and Red Valley.

BOOK NOTICE

DIGEST OF WIRELESS TELEGRAPHY PATENTS. The James T. Allen Patents Publishing Co., of Washington, D. C., is preparing a digest of Wireless Telegraphy (space) patents which will contain all of the American wireless telegraphy patents issued between 1789 and December, 1903. The work will appear in the early part of 1904. The prospectus has been issued, a copy of which the publishers will send to any one interested. The publishers say this work will be the only one ever published comprising this class, and the material is being prepared with great care and labor. It will contain 500 pages of drawings, the specifications and claims in full, and will be clearly and distinctly photographed, and can be as readily understood as the printed copies of patents furnished by the Patent Office.

It will contain all of the reissues, designs and trade-marks granted during the above period, accompanied with the full specifications and claims. Especial care will be given to the arrangement of patents, to simplify and facilitate expert, validity and preliminary examinations, and to this end the patents will be arranged chronologically under fifteen sub-divisions. A general alphabetical index will be provided, in which will be given a list of the references cited, by number,, name and date, interferences, parties thereto and decisions, while the applications, now patents, were being examined in the United States Patent Office. The Digest will be in one volume and the edition, the publishers say, will be positively limited.

TRADE NOTES

THE FRANKLIN ROLLING MILL AND FOUNDRY COMPANY, of Franklin, Pa., reports among its other late shipments, a consignment of 112 of its Tripartite Street Railway Poles to the Interstate Construction Co., of Philadelphia, Pa.

THE STROMBERG CARLSON TELEPHONE MFG. CO. announces that Mr. H. B. Hewitt, its State representative for Missouri, who was permanently located at Keithsburg, Ill., has moved to Chillicothe, Mo.

THE NATIONAL WIRE CORPORATION, of New Haven, Conn., has issued a Special Price List and Tables which is dated November 1. The list gives the properties of galvanized telegraph and telephone wire and the latest net prices. Galvanized Steel Wire Strand is also priced and its principal properties tabulated. The company will be pleased to send the list to any one interested.

LOUIS M. PIGNOLET, of 78 Cortlandt St., New York, has incorporated in the manufacture of his volt-ammeters an idea which will at once appeal to those who have many resistance measurements to make by the volt-ammeter method. The voltmeter coils are so wound that they have a resistance of 100 ohms for each 5 volts on the scale. From this one can know immediately how much to subtract for voltmeter resistance when making a resistance measurement.

THE ELECTRIC APPLIANCE COMPANY, of Chicago, has finished its distribution of catalogue No. 19, which is devoted exclusively to telephones, telephone and general construction material. This catalogue contains in a condensed manner, everything of a standard nature that is used in telephone exchanges and exterior work, including a very complete line of telephones of every type. The book has three hundred pages in it, is well bound in light green cloth stamped in black, and is generally conceded to be one of the best compiled and arranged books on this subject that has been published. Any one who is interested in the telephone business and who has not been supplied with this catalogue would do well to make application for a copy. With it the company send a complete perpetual net price list, giving lowest market prices on the goods listed. This price book is so arranged that as the prices change new sheets will be furnished which can be readily inserted.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED.—Position as manager of Independent Telephone Company, by an energetic man with five years' experience as manager of Bell exchange of 4,000 subscribers. Best of references furnished. Address, Box 110, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York. 110

YOU USE THEM EVERY DAY.—Toll Tickets for Independent Companies. Five thousand, 3 colors, prepaid, $2.50, cash with order. THE AMERICAN TELEPHONE JOURNAL knows we are O. K. Write for samples; also figures on large quantities. GILDART BROS., Albion, Mich. 112

POSITION.—A first-class telephone man possessing a technical education and seven years' practical experience desires position as superintendent of a small, progressive telephone system. Best of references furnished. Address, Box 113, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 113

POSITION wanted with reliable telephone company as manager or superintendent. Ten years' practical experience in telephone work. If your plant is not paying dividends, let me hear from you. Can furnish best of references. North or south preferred, but am willing to go to any part company desires. Address, Box 108, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 108.

POSITION.—A first-class construction man with thirteen (13) years' experience in telephone (both Independent and Bell) and electric light work, desires connection with a telephone company in its construction department. Will be at liberty Nov. 30. Address, Box 99, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 99.

WANTED—All or any part of $50,000.00. WRITE TO-DAY for particulars. The BIGGEST PAYING TELEPHONE PROPOSITION of the day. OPEN for a LIMITED length of TIME only. Address, Box 107, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 107

GENERAL MANAGER.—Gentleman of executive ability, for number of years general manager of (Bell) Telephone Co., fifty exchanges, 25,000 subscribers and several thousand miles toll lines, will be open for engagement with an enterprising Independent company in December. Familiar with all details of construction, maintenance, operating and successful dealing with the public. Best of references as to ability. Address, Box 109, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York

WANTED—Young telephone men who would like to make extra money by easy, pleasant work during spare moments. Write now for full particulars. Address, Box 111, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 111

TO BUY for cash, telephone exchange of 250 to 500 subscribers in Middle or Western state. Address, Box 104, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 104

MANAGER—A good, live, energetic, capable man of experience wanted to manage a large Independent telephone system in the West. Must be able to invest not less than $10,000 in the company. Address Box 102, THE AMERICAN TELEPHONE JOURNAL, No. 116 Nassau street, New York City. 102

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 73.

The American Telephone Journal

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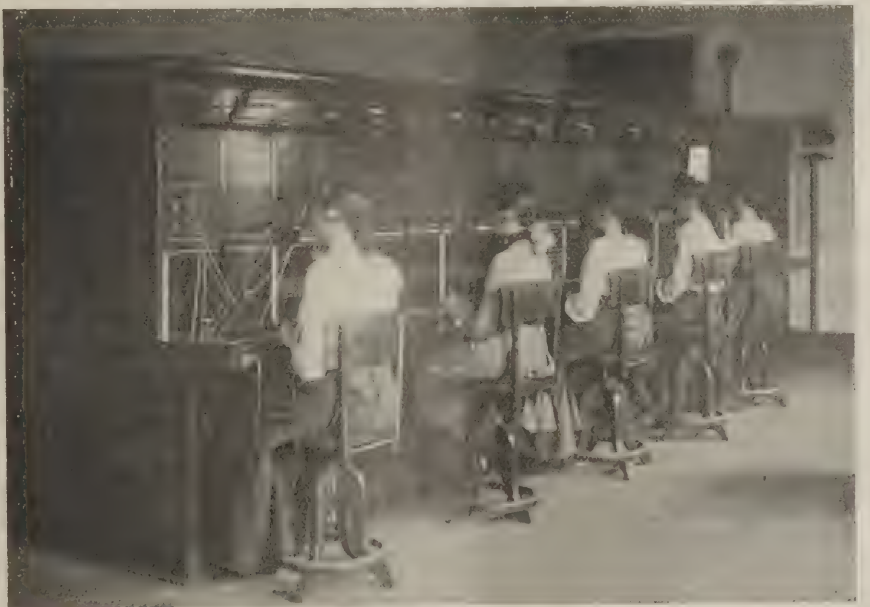
VOLUME VIII SATURDAY, NOVEMBER 28, 1903 NUMBER 22

THE CARNEGIE STEEL COMPANY'S BRANCH

By Elmer Shroud.

WITHOUT a doubt the most important factor in accelerating business nowadays is the telephone. Less than five years ago the use of more than one telephone by one firm was an extravagance, and its adoption by any but the largest houses was deemed a decided luxury in the eyes of the business public. Soon, however, it became so necessary to the progressive business man that he found one instrument entirely inadequate to handle his calls. Hence the private exchange, thousands of which are to be found now in the large cities of our country. With many of the large firms to-day we find a telephone supplied to every department and often several telephones in one department. When such a number is required it is the part of wisdom to have a telephone exchange installed by some first-class company on the premises of the subscriber who employs his own operator. This gives him a telephone exchange system of his own with trunk lines connecting it with the telephone company's main exchanges, thus furnishing means of communication to the world outside.

In Pittsburg, the great center of iron and steel manufacturing and the headquarters for the enormous coal, coke, gas and oil industries of Pennsylvania, West Virginia, Ohio and the southern states, the telephone is indispensable in the transaction of the immense business conducted. The Carnegie Steel Company, having the largest congregation of offices centered in one place of any corporation in America, has recently installed, through the efforts of the Pittsburg & Allegheny Telephone Company, one of the most progressive Independent telephone companies in the country, a most modern and up-to-date system of five private exchanges. One of the exchanges is located in the main office of the Carnegie company in the Carnegie building, Pittsburg. The others are located as follows: one at Bessemer furnace, Braddock; one at the South Sharon works; two at Youngstown, O., one of them being in the Upper Lower mills and the other in the plant originally known as the National Steel Company and now called the Ohio works.



Private Branch Exchange Installed by The Pittsburgh and Allegheny Telephone Company for the Carnegie Steel Company.

The illustration shown herewith gives a good view of the main exchange in the Carnegie building, Pittsburg. It is a strictly modern plant in every particular, and with the other exchanges comprises probably the largest contract ever given any telephone company in Pittsburg for private exchanges. The switchboard is of the lamp relay type. This one exchange is large enough to supply service to a good sized town or small city. In addition to the large number of telephones connected with it, the exchange also has a great number of local and long distance trunk lines terminating on it. The multiple and answering jack system used is the branch terminal two wire bridging tap, having no series or three wire contacts in the jacks. All jacks on the line are entirely disconnected from the outside lines, except when the line is actually in use, thus giving the greatest possible freedom of damage from outside high potential currents.

The line and talking circuits are strictly metallic, and the key shelf in every subscriber's position is drilled for 15 pairs of cords and equipped with 12 pairs and each position is provided with 160 answering lamps. A main distributing frame equipped with arresters and heat coils is provided. There is also an intermediate distributing frame and relay rack. Nothing but flame proof jumper wire is allowed on the cross connecting frame. A complete power plant, consisting of two Holtzer - Cabot multipolar generators, two ringing sets with busy back, and 11 cells of chloride accumulator, together with power board, voltmeters, ammeters, circuit breakers, and everything necessary to a complete and modern telephone outfit has been installed. The woodwork is of genuine mahogany of the highest rubbed polish, and with the glittering instruments it is the pride of the officials and the source of admiration to their business callers from all over the world. The equipment described has been installed lately by the Pittsburg & Allegheny Telephone Company, which will maintain and operate it in connection with its immense system of public exchanges. Over its lines the Carnegie Steel Company is now able to reach more than 250,000 telephone subscribers scattered over a dozen different states.

The installation of the Carnegie plant, while it marks the culmination of the many notable successes the Pittsburg & Allegheny

Telephone Company has won in business against the fiercest and most underhand opposition is but one of the many large contracts it has received during the last few months. The company commenced construction in Pittsburg in the spring of 1899, only four years ago. It was then the intention of the management and owners to install a plant for 5,000 telephones. The growth of the company was so rapid however that these original plans had to be vastly modified and broadened in 1901. Again in the spring of 1903 the company was entirely refinanced with a bond issue of $6,500,000, preferred stock amounting to $2,500,000 and common stock totalling $2,500,000. Nearly $1,000,000 in cash was also provided for extensions and improvements. Since this reorganization the company has been vigorously pushing its plants and has greatly increased its revenue. Its marvelous growth is reflected in its new directory, which is nearly ready for distribution and which will contain the names of nearly 15,000 telephone subscribers, a very tidy show of business for four years work. The Pittsburg & Allegheny Telephone Company is now the largest Independent telephone company in the United States with the possible exception of the Keystone Telephone Company, of Philadelphia. The Keystone Company may have a larger list of subscribers, but it does not cover the vast territory reached by the P. & A. company.

In addition to the contracts secured with the Carnegie Steel Company, which were the result of thoroughly satisfactory service to the big manufacturing concerns of Pittsburg in the past four years the following concerns, all underlying companies of the United States Steel Corporation, have adopted private exchanges and had them installed by the Pittsburg & Allegheny company, the American Tin Plate Company, the American Bridge Company, and the Sheet Steel Company. Lately the Pittsburg & Allegheny company has also installed and supplied many banking and business institutions of Pittsburg and Allegheny with modern exchanges. The affairs of the company are now under the immediate supervision of Joshua G. Splane, president, and Sidney H. Browne, vice-president and general manager.

TOLL LINE TESTING AND MAINTENANCE.

By B. C. Wilhelm.

THE science of locating trouble on telephone lines is a combination of mathematical calculation, more or less complicated, and the application of certain knowledge and skill obtained from experience. The wire-chief, whose duty it is to maintain the plant both within the exchange and without, must be a man with a trained ear and a knowledge of every detail of the plant over which he is exercising supervision. In this article the subject of clearing trouble on toll lines will be approached from a practical standpoint, and an attempt will be made to show how the various troubles met with are located and cleared in every-day work. Theoretical considerations will be touched on only when necessary.

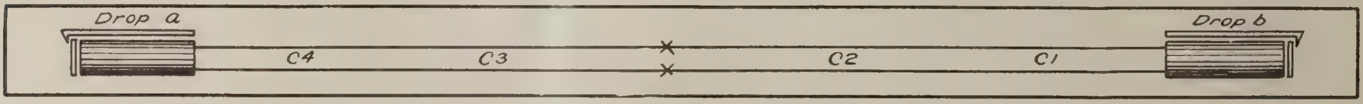


Figure 1.

The following troubles are encountered in the every-day working of toll lines:

(1.) Opens.
(2.) Grounds.
(3.) Crosses.
(4.) Shortcircuits.
(5.) Cut-outs.

Under heading No. 1 are included all cases in which the continuety of the line is broken. In most cases when a line is open no signalling or conversation can be carried on over it. When long lines are open on only one side, particularly where the point of fracture is located in a cable, conversation may be carried on. A trained ear can, however, detect this condition by the quality of the transmission.

Under heading No. 2 is included all cases in which one or both sides of the line form an electrical contact of more or less resistance with the earth. When this contact is good, it is spoken of as a "*dead ground,*" and as the resistance increases, the trouble becomes a "*slight ground*" and finally an "*escape.*" Dead grounds and slight grounds are accompanied by noise, while escapes are detected only by measuring the insulation resistance of the line to ground.

Under heading No. 3 is included the condition in which one or both sides of two or more circuits come into electrical contact. This condition is denoted by the fact that conversation on any one line can be heard on all the others so affected. This is technically called cross-talk.

Under heading No. 4 is included the condition existing when both sides of a circuit come into mutual electrical contact. When this happens conversation cannot be carried on. The last heading includes the cases in which the quality of the transmission varies during short periods, caused by the existence momentarily and intermittently of only one of the above troubles. The routine pursued in clearing trouble consists first in determining what class of trouble exists, then locating it, and finally having it cleared by repairing the defect. The troubles will be treated in the order named, and the simplest conditions will be dwelt upon first.

If a toll line is open, the trouble cannot be located by a simple test. Reference to Fig. 1 will prove this point. Let *a* and *b* denote the drops at the extremities of the toll line c^1, c^2, c^3, c^4, and suppose it to be open at *x*, *x*. The nature of the trouble will be determined by the fact that neither drop can be rung down, and that conversation cannot be carried on. But no test that is practicable for a wire-chief to make will give the location of the point of fracture because the results are negative. Therefore, after having located the trouble outside of the exchange by the simple process of having an assistant short circuit the line at the main distributing board, while a telegraph relay with battery in series is connected to it as shown in Fig. 2, a lineman is sent out. In Fig. 2, *a* represents the relay, *b* the battery, *c* the telegraph sounder wired to the contact of the relay with the

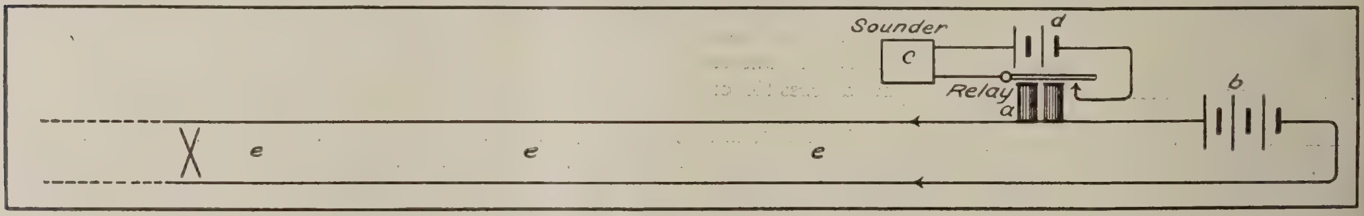


Figure 2.

battery d in series. So long as the line e, e, e, remains open, no current flows through the relay and the sounder does not click. Upon the circuit being closed, however, as at x, current flows and the sounder clicks, providing no open exists between x and the relay.

All toll lines have test points. If the wires as they leave the office are in cable, but ultimately take open wires, the first test point will be the cable-box where this change takes place. If the toll line is very long, say 100 miles or more, test poles, where the wires may be opened, are placed at intervals of 30 miles or so. If the line passes through several exchanges, these latter will afford testing points, and under this condition, tests are made with these other exchanges before the lineman is sent out, the trouble being located between the exchanges. In any case, however, the test consists in successively short circuiting the wires until a closed circuit is shown. The lineman is then sent out to find the trouble and clear it.

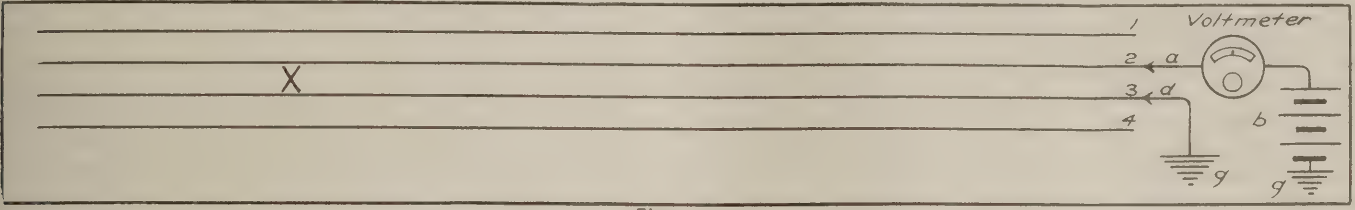


Figure 3.

To explain in detail, suppose the test is made from b towards a in Fig. 1, and suppose that c^1 is the first test point, the line will show closed. It will also show closed to c^2, but will show open to c^3. Obviously the trouble lies between c^2 and c^3. The lineman is sent out between these two points. In making this test, conversation must be carried on over another trunk, when the open lies between the exchange from which the test is being made and the testing points. This is always easy to do, since there are nearly always several trunks between the two points. Should there be only one, however, communication can be established by means of a circuitous route. As a usual thing the relay and sounder are kept plugged in on the trunk being tested, so that the noise made by the sounder when a closed circuit is obtained may attract his attention. So that while the lineman is locating the trouble outside, the wire-chief may be attending to other matters.

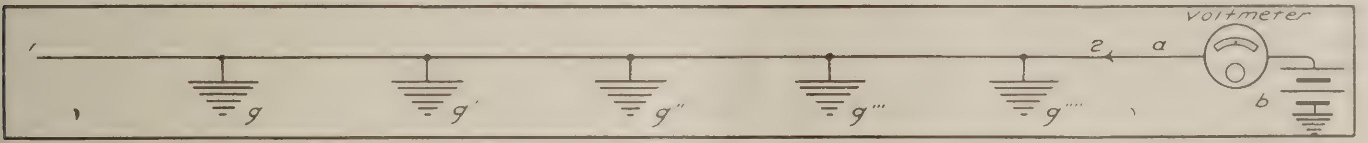


Figure 4.

It is possible to locate grounds by the application of proper tests, as under these conditions a circuit is left to test with. The best tests to use for this purpose are the Murray or Varley loop tests. These, however, are seldom made by the wire-chief. The tests he uses are of the cut and trial order already described but modified to meet new conditions. The fact that the line is noisy is determined by the presence of noise, which is slight or heavy, according as the ground is slight or dead. The instrument used by the wire-chief in testing grounds is the voltmeter. The instrument should have as high a resistance as possible, consistent with the utmost sensitiveness. The resistance usually adopted is 40,000 ohms, and the scale is such that a full reading can be obtained with 40 volts of battery. In locating crosses, a test must be made on both lines so effected. The method of handling this class of trouble is shown in Fig. 3. Here suppose that 1 and 2 are the conductors of the circuit, and that 3 and 4 are those of the other. Let the two circuits be crossed at x. Let v be the testing voltmeter and b the battery grounded at g. At d is shown the auxiliary testing circuit grounded at g^1. The voltmeter is connected to one conductor of one line, while the auxiliary circuit is connected to one conductor of the other. If the two conductors to which these two circuits happen to be connected are those which are mutually crossed, as shown in the figure, a close circuit will be formed including b, v. Conductor No. 2, conductor No. 3, and d, which is completed through the cross at one end and the ground g and g^1 at the other. The method of locating the cross, either within or without the exchange, is done in the manner already described.

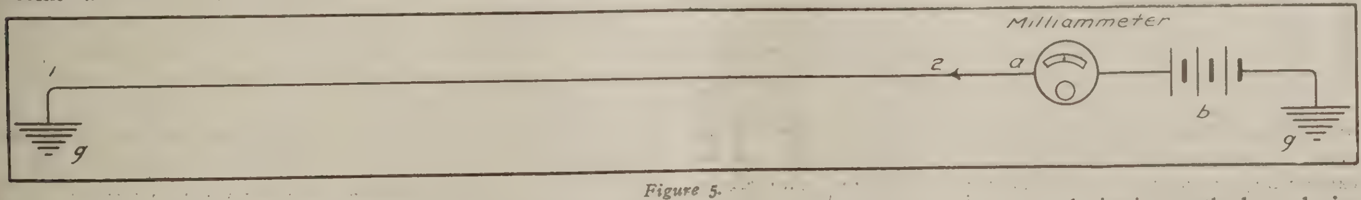


Figure 5.

Short circuits are detected in the same manner as grounds, with the distinctive feature that a closed circuit is not obtained unless the conductor opposite to the one carrying the testing voltmeter is grounded. The insulation resistance of all toll lines should be measured for record, and from time to time this test should be repeated. The results of the successive tests should be compared with the record with a view of detecting any possible deterioration. The first test should be made both in dry and wet weather; but the succeeding tests need only be made under the latter condition. This test is made by means of the testing battery and voltmeter in the manner shown in Fig. 4. Here let 1-2 represent one conductor of a toll line; a the testing circuit; v the voltmeter and b the battery. Whatever current flows through the voltmeter must pass to ground through the insulation of the line as shown by the ground symbols at g, g^1, g^2, g^3 and g^4. The magnitude of this current flow will vary in inverse ratio with the magnitude of the insulation resistance, so that it will afford a means of measuring the latter quantity. It is done by the following formula:

$$R = \frac{E - e}{e} r \qquad (1)$$

Where R denotes the insulator resistance,
" E " " potential of the testing battery,
" e " " reading of the voltmeter,
" r " " resistance of the voltmeter coils.

For example, suppose the voltage of the testing battery to be 40, and the resistance of the voltmeter coil to be 30,000 ohms. Suppose that the voltmeter when connected to a certain conductor gives a reading of 10, then

$$R = \frac{40 - 10}{10} (30{,}000) = 90{,}000 \text{ ohms.} \qquad (2.)$$

Insulation can be tested in this manner much more rapidly than by the use of the bridge or substitution methods, and gives accurate enough results for all practical purposes. Such a test is made on toll lines about once every month.

Another very important test to make is to measure the metallic resistance of each conductor of a toll line. In order that long lines should be silent, it is imperative that both conductors should have the same resistance. The condition of unbalance often has its origin in the fact that linemen make bad joints, and such trouble as impossible of location except by accident.

To make this test, a low reading voltmeter, with a scale of 0 to 2 volts, or better, a milliammeter of a range of 0 to 599 milliamperes is connected to the testing battery, at one terminal, its other terminal being connected to the line in question. This arrangement is shown in Fig. 5 where *1* and *2* represent as before, the conductor to be tested, *a* the testing circuit, *m* the milliammeter, and *b* the testing battery grounded at *g*. The line to be tested is grounded solidly at its extremity at g^1, so that the return circuit is obtained through the earth. The voltage of the testing battery being known the resistance of the line is measured in terms of the current flowing through the ammeter. The following equation is used:

$$R = \frac{E}{C} \qquad (3)$$

where R equals the resistance of the line.

E denotes the E. M. F. of the testing battery, and C, the reading on the ammeter. The internal resistance of the batteries and of the testing circuit, if this latter quantity is appreciable, must be determined and deducted from the resistances of the lines as read off by the ammeter.

To illustrate this method of measuring line resistances, suppose that, with a testing battery of 40 volts, the reading on the milammeter is 250 milliamperes, then equation 3 would become:

$$R = \frac{40}{.250} = 160 \text{ ohms.—(4.)}$$

Measurements of impedance and capacity are not made as a regular thing, as these quantities vary rarely; and when they do vary, it is always as a result of the introduction of other troubles, which are found and cleared in the manner already described.

It would be impossible to give a statement of the induction of any line, unless all the surrounding conditions were known, such as the spacing between wires, the proximity of other wires, the proximity of the earth and the like. Records of these quantities are not kept, and they are never determined, except for special purposes.

TELEPHONE EXCHANGE ENGINEERING

ARTICLE XIII—SWITCHBOARD CABLE AND CABLING

By Ray H. Manson, Albion D. T. Libby and Charles A. Simpson.

THE subject of exchange wiring is of vast importance to the manufacturer, as it rests with him to produce, with a given central office plan, the most efficient and economical method of connecting the various circuits required, and at the same time have this wiring in such condition as to be easily traced. The apparatus in the face of the switchboard must be arranged to facilitate the act of making connections without respect to economic circuit wiring, and herein lies one of the difficulties encountered in the construction of large capacity switchboards.

It will thus be seen that the size and arrangement of the central office building, determines the grouping of the various parts of the exchange equipment. In the majority of cases, a properly designed telephone building is not to be had; the lack of space, or the cutting of available space into small rooms by permanent partitions and walls, necessitates expensive and inefficient wiring between the switchboard and groups of exchange apparatus. With a given floor plan of space available for the various parts of the exchange equipment, it will be found that there is only one arrangement possible which will give the most efficient operating cable lay-out. Then again there will be another arrangement which will give the most economical cable layout as respects the first cost of installation; efficiency and low first cost thus not necessarily keeping together. The telephone company's engineer should go over the manufacturer's layout and see that the above items are balanced.

With the apparatus properly located and connected with suitable runways for the circuit wiring, it becomes necessary to determine the size of conductor, and arrangement of the same between the terminal points. The size of the conductor is limited on one hand by current carrying capacity, and on the other hand by necessary mechanical strength. Some circuits might require a low resistance conductor in order to properly work the signal system, and a copper wire as large as No. 18 B. & S. gauge might be necessary, while other systems with circuits, not limited in their proper and efficient working to low resistance of the exchange wiring, can use much smaller conductors, and in this case mechanical strength is a limiting factor. Thus, a No. 24 B. & S. gauge copper wire might come within the allowable limits. The smaller the wire used, the less space occupied by the cables, and the advantages thus gained must be taken into consideration with the items, carrying capacity and mechanical strength.

The wire used in running the exchange circuits, whether formed into cables or not, is liable to be soldered at any point in its length, so it has been found economical to have it completely tinned before the insulating covering is put on. The insulation of the conductor is usually of silk, single or double wrap, with an outer covering of cotton. The silk gives high electrical insulation, while the cotton serves primarily for a mechanical protection to the inner covering and at the same time when provided with a distinguishing color code, serves as an assistance in following out the circuit wiring.

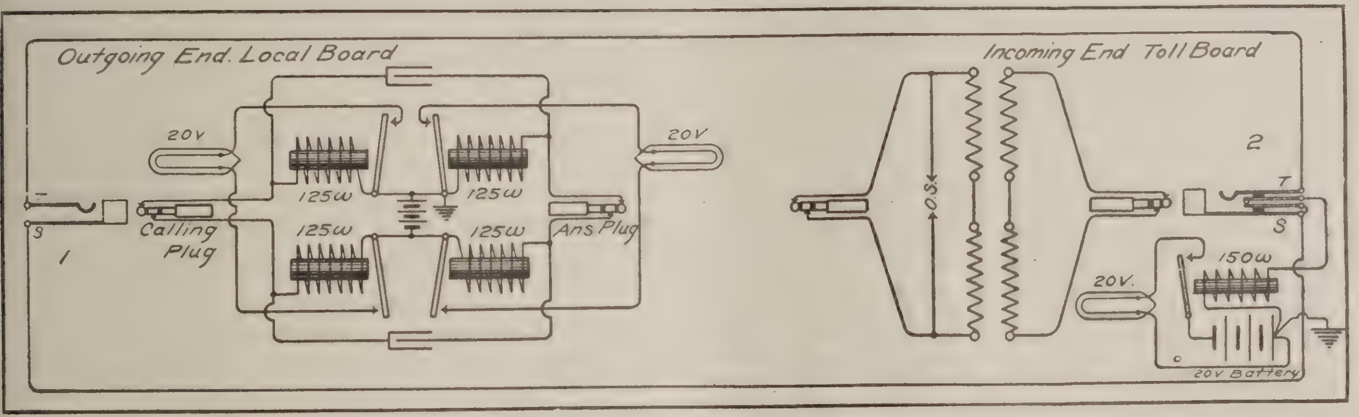
As modern design requires all talking circuits to be metallic in an exchange, no matter what condition the outside construction may be in, they must be run with twisted pair wire, thus keeping each exchange circuit transposed in respect to all others for its entire length. This will effectually prevent cross talk or other inductive disturbances, providing there is no unbalancing due to other sources, such as placing apparatus in one side of the circuit and not balancing the other side. Twisted pairs are usually provided with a plain (white) covered conductor for the tip of line or circuit and its mate, a color code wire for the ring of the same circuit. Six twists per foot have been found to give good results for both flexibility and balance of circuit. The exchange apparatus being grouped and arranged in numerical order, will allow bunching of the circuit wires for convenience in handling. Short runs or local wiring, which require a rather complicated layout and many different kinds of conductors, are made over special forms by hand, and are known as *hand made cables*, while all long runs between the apparatus frames, and between the frames and switchboard, are usually run with what is called a *machine made cable*. Machine made cable is constructed with a sufficient number of conductors of twisted pairs to connect up each bank of apparatus as mounted; the number of conductors per cable, varying from 10 to 100 pairs, in practice. A distinguishing color code for each pair, or for each single conductor, arranged in regular order, serves to facilitate the hand work necessary in cabling. It also makes circuit tracing easier.

The conductors are usually laid spirally in the cable to give flexibility. Increasing the number of turns in the spiral makes the cable more flexible, but at the same time increases its diameter, so 1½ twists per foot is taken as a good average in practice. The covering of the cable is more of a mechanical protection than an electrical insulation, and consists of two or more reversed wrappings of manila paper tape, and an outer cotton braiding. One make of cable has a metal sheath of lead tape over the cable wires, which, in conjunction with a ground connection, serves to reduce the electrostatic capacity of the cable. The outer cotton braiding may be either saturated with hot beeswax, and polished, making a good insulation and a moisture proof covering, or provided with a coating of lead paint.

TRUNK CIRCUIT FROM LOCAL TO TOLL BOARD

By J. R. Gemmill.

In a recent number of The American Telephone Journal, a trunk circuit was shown extending from a toll board to a local board. The circuit shown in the accompanying illustration is that of the reverse circuit, or one from a local board to a toll board. When a subscriber desires a toll connection he signals in the usual manner to the local operator, who inserts the connecting plug into a trunk jack, shown at *1* in the illustration. This jack, as is easily seen from the circuit, is connected by a line that appears in a jack at the toll board No. *2*, which is also equipped with a lamp or other signal. All the trunks from the local board are carried to one or more special positions on the toll board that are termed recording positions. The object of this is to provide a means of keeping a record of toll calls. The operator at a recording position, upon seeing a signal, plugs into the incoming trunk jack and can immediately talk to the calling party. This she records upon a ticket, and then informs the calling party that he will be called as soon as the desired subscriber can be obtained. As soon as the ticket is completed the recording operator instructs the real toll operator to call the desired town and party specified, and as soon as they are obtained to notify the calling subscriber.



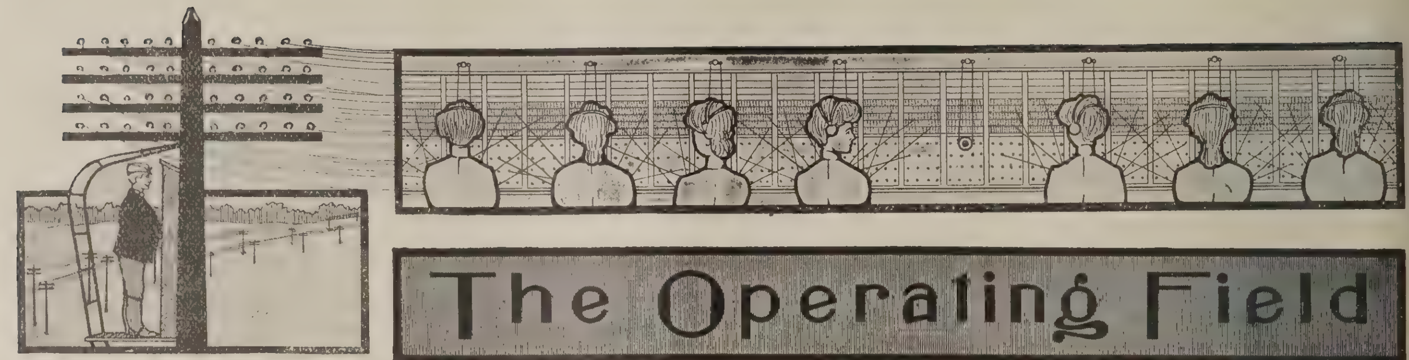
By referring to the drawing it will be seen that the trunk consists of a tip and sleeve jack on the local end, and a No. *22* or break jack on the L. D. end. The sleeve side of the break jack is strapped, or common to one of the inner springs, while the corresponding spring of this jack is connected by insulating material to the tip spring of the jack, and by inserting a plug, connection, which is normally closed, is then broken. This second inner spring is connected to a line relay, marked *150* in drawing, and through this relay to live side of battery. The usual 20-V. line lamp is employed in connection with this relay. On the recording operator's position the cords may be equipped with repeating coils, as shown, without any ringing key, as this feature is not needed on this position. The operator's set, marked *O. S.*, is bridged on the "dead" half of the coil, and for this reason, if it be on the other half of the coil, the circuit will be broken, at such a time as the recording operator should close the key, and as will be seen further on, would give a signal to disconnect on the local board.

When the calling party is connected to L. D. by the local cords, the following action takes place: Battery flows through relay on sleeve side of local cord, through trunk to the sleeve side of *22* jack, through strapped spring, through line relay (marked *150*) to "common" or "ground." Pulling up relay on sleeve side of local cord, also relay on L. D. end, giving line signal at toll board, also one light on local board. When the L. D. operator plugs in and opens the jack, cutting off the relay and light, the battery on local cord then flows through repeating coil, back the tip side of trunk, through relay on tip side of cord circuit to battery, pulling up tip relay, sleeve relay already being up, puts out the light on the local cord. When the toll operator disconnects the circuit is no longer completed through the tip side, this relay falls down and gives one light, and the calling party, having "hung up" gives the second light. Then the local operator disconnects. While this method of operation may at first sight seem somewhat clumsy, experience has shown that the recording operator is a most valuable adjunct to a toll system by the increased income derived from an accurate system of toll tickets.

PENNSYLVANIA R. R. TO OWN TELEPHONE WIRES

The Pennsylvania Railroad will begin the immediate construction of two trunk line telephone wires between Pittsburg and Philadelphia, at a cost of $74,806. The lines will be used exclusively for the use of officials of the company and will supplant one through wire leased from the Bell Telephone Company. The estimated cost is exclusive of poles. The wires will be strung on the new poles recently erected by the Pennsylvania Railroad for the use of the Postal Company. They will be of the heaviest copper, and it is said that the line will be the most expensive one ever built. In addition to the new through lines, the company will maintain its own telephone wires between division points, such as Altoona and Pittsburg and Altoona and Harrisburg.

The building of two through lines for talking purposes shows to what extent the Pennsylvania values the telephone. It is one of the most important factors in the movement of trains, having been adopted several years ago on all branch lines of the Pittsburgh division. The number of men is reduced in transmitting orders by telephone as against telegraphy, and where fast service does not exist, the element of danger is about equal in both cases. The more important and urgent messages transmitted between division points or Pittsburgh and Philadelphia are sent both by telephone and telegraph. Under the present order it is said that it takes about as long for a message to reach its destination over the telephone as over the telegraph wires. The wires now in use are in great demand during the busy hours of the day, and the constantly increasing business between the lines west, officials and the general offices in Philadelphia have forced the company to build its own telephone lines.



The Operating Field

THE INDEPENDENT'S MOTTO.*

By David Prewitt.

THE motto of this state is and must always be the motto of Independent Telephony. "United we stand: divided we fall." Only six years ago, a few small isolated exchanges represented Independent telephony in the State of Kentucky. The apparatus was crude. The construction was bad. The service was execrable. Ignorance was the rule and the only information obtainable was from catalogues issued by the manufacturers or an occasional drummer whose ideas were vague except that his house sold the best apparatus on earth and if they didn't have what you wanted they would make it for you while you waited. You usually waited a good while.

This association was organized. It brought us together. It encouraged us. It educated us. The weak-kneed brother sold out to the Bell and a few traitors pocketed their Judas money. The results are not matters of speculation, but of fact.

We represent to-day an up-to-date exchange in nearly every town and city in the state. "In unity there is strength." Six years ago the telephone public were fairly well satisfied to be in connection with one city. Then they demanded connection with the surrounding county; then with neighboring cities. The demand will shortly be for connection with the whole country. It was the toll line that made an association among neighboring exchanges imperative. It was the fact that every man's territory is beyond the bounds of his own plant. It is an extension of this idea that has made the Inter-State Independent Association a necessity. About seven years ago such an association, called the National Association, was organized. For several reasons it did not succeed. I believe it was organized too soon to fill the sphere that such an association should fill. That it and the coterie of gentlemen composing it did yeoman service for the Independent cause is history. That with their brains their time and their money they fought the Berliner suit and won it, places Independent telephony under an everlasting obligation to them.

That they seemed to desire to hold the National Association in their control, created wide dissatisfaction. I have never heard it given an excuse, but I presume that as long as the National Association was used as a means of reimbursing themselves for moneys expended in the defence of the Berlinger suit, they wanted to keep the control for themselves.

The fact remains that enough dissatisfaction appeared to form another association, covering a part of the territory covered by the National Association. This association, the Inter-State, covers nine states of the Middle West. There has been some feeling engendered between the two associations, which is unfortunate. I hope that good sense and conservatism will prevail. I hope to see the next meeting a joint meeting of the two associations. "United we stand; divided we fall." That the State Association will in the future exercise a wider and more authoritative voice in the telephone business, is beyond a doubt.

We have run along on trust and done well, but the time will come, and that shortly, when treachery will be and must be guarded against. That your neighbor remains Independent has come to be absolutely essential to your success. Plain common sense demands that you have something more binding than fidelity to the cause. The time is coming when the State Association must be able to give assurance to all its members that each of them will maintain his integrity as an Independent. The same must be true of the Inter-State. It must hold such legal control as will insure to every Independent plant in the United States that it will always have the connections that it has, and with that feeling of confidence the telephone business will be the safest and most desirable investment that offers and will always preserve its local nature.

TELEPHONE MEN MEET AT MEMPHIS, MO.

By Wm. H. Elges, *Special Correspondent.*

THIRTEEN telephone companies operating in the northern part of Iowa and of the southern part of Missouri were represented at a meeting held in Memphis, Mo., recently. The object of the meeting was to organize a mutual telephone association. Representatives were present from the following cities: Kirksville, Mo.; La Belle, Mo.; Moulton, Ia.; La Plata, Mo.; Lancaster, Mo.; Kahaka, Mo.; Downing, Mo.; Centerville, Ia., and Edina, Mo. During the meeting constitution and by-laws were reported and adopted. Several talks were made and many points discussed. The officers are as follows: J. M. Janye, Memphis, Mo., president; J. M. Kennedy, Kirksville, Mo., vice-president; W. Melvin, Lancaster, Mo., secretary and treasurer; J. M. Kennedy, Kirksville, Mo., purchasing agent; E. B. Berberet, Edina Mo.; C. D. Long, La Belle, Mo., and J. B. Goodding, La Plata, Mo., compose the executive committee. The time and place for the next meeting was left with the executive committee.

SOUTHEASTERN IOWA ASSOCIATION MEETING.

REPRESENTATIVES from about seventy-five of the leading telephone exchanges in Southeastern Iowa attended the semi-annual meeting of the Southeastern Iowa Independent Telephone Association held in Ottumwa, Ia., on November 18. Sessions of the convention were held in the building of the Ottumwa Telephone Co. Matters of general interest were discussed. The officers of the association are:

President—Dr. H. S. Herr, of Ottumwa.
Vice-president—W. H. Fowler, of Pella.
Secretary and treasurer—W. K. Densmore of Oskaloosa.

ALL NAMES IN THIS DIRECTORY.

A TELEPHONE directory which will contain not only the names and telephone numbers of all subscribers to the Chicago Telephone Company and the Illinois Telephone and Telegraph Company, but also the names of all persons who are not subscribers, but have access to a telephone is to be issued by a Chicago concern. The book, it is said, will be delivered at all telephones and will contain from 125,000 to 150,000 names. It will have a circulation of about 75,000 copies. It will give, concerning each person mentioned, his name, business, the name of the firm he is with or a member of, his business address, the telephone used at business, his home address, and the telephone by which his home may be reached. The directory will be issued in January and July of each year. Similar directories will be issued in other large cities. That for Chicago will be known as the Chicago Branch directory and copies of it will be placed in public places in other cities for use by those wishing to call Chicagoans on the long-distance telephone.

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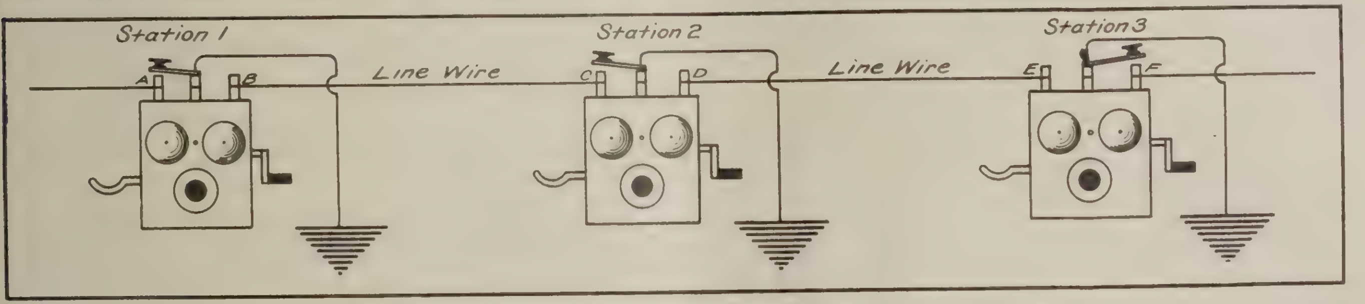
*Abstract from an address delivered before the Kentucky Independent Association.

A SERIES LINE SWITCH.

In some few places series telephones are still used on party lines and the scheme here outlined may be of value to any one who still has such a line under his care. As the drawing shows, a switch is provided on each telephone so arranged that either bind post of the telephone may be grounded by turning the switch to that bind post. The switch may be made of a piece of spring brass and should be arranged so that to have it make contact with the bind post it is necessary to press down on it. The drawing shows about the proper shape. Suppose it is wished to ring to the left from *Station 2*. The switch at *Station 2* is moved to the bind post *D* and pressed upon until contact is made with the bind post. Then the generator crank is turned and all of the bells to the left are rung and as the ringing current encounters less resistance than it would if the switch were not used, a stronger current is the result and consequently the bells ring louder. It will also be noticed that if any one else is talking on the line to the right of the ringing station (*Station 2*) that they will not be cut off but the path of their talking current will be completed through the ground switch as long as it is held down. When starting to make a call, the caller can listen in on the line and find if it is in use and if he is sure the end of line which he does not wish to use is being utilized he can press his switch on the proper bind post and keep it there until the conversation is finished; thus no one will be inconvenienced. In other words, with this arrangement it is possible to accommodate two conversations on a series line, where with the ordinary arrangement only one could be accommodated. This way of connecting will be found especially convenient if the line happens to be open, as the service one way will not be interrupted and by means of the switch a test can be quickly made, which will determine the direction a man should be sent to repair the break. It is quite essential that the switch be arranged so that it will spring away from the bind post when it is not in use; otherwise there will be a continuous trouble from grounds on the line, caused by careless subscribers leaving the switch on one of the bind posts.



UTICA COMPANY GUARANTEES 3 SECOND SERVICE.

The announcement of the decision of the Bell Telephone Company in Utica, N. Y., to reduce its rates on residence lines, has caused much speculation regarding the future action of the Home company of that city. Secretary and Manager C. H. Poole of the latter company, in response to a request for a statement on the situation said:

"Anything I can say will be an advertisement for the Home company."

"Are you going to meet the rates of the Bell company?"

"Meet them?" responded Mr. Poole, "We don't have to meet them; we have the better rate still. As I understand it the Bell company now offers an unlimited single line residence service for $33. We offer the same thing for $22. In addition our system includes 2,170 telephones, by actual count yesterday, which is, I believe, 50 per cent. more than those of the other company. Now, if we furnish 50 per cent. more subscribers, shouldn't we charge 50 per cent. more than they do, or $49.50? But we don't. Our price is $22. As for that $18 rate for party lines, it is foolish for us to think of it. With our underground cables, aerial cables and aerial open work, we have accommodations for 2,000 more single lines than we have. Then, what's the use of trying to make party lines? They aren't successful anyway. In addition to this, all I have to say is that if a subscriber wants it, we'll make a contract for a three-second service or no pay."

STROMBERG-CARLSON'S NEW BUILDING.

Plans have been filed by the Stromberg-Carlson Telephone Manufacturing Company for the erection of a large factory building on its property in East Rochester, near the Culver road. This is the third factory building in the Rochester plant and will be a duplicate of the main factory now occupied by the company. It will cover nearly three acres of ground, being 291 feet wide and 297 feet long. The building will be of brick, and in all details will be similar to the present main building. The estimated cost is in the neighborhood of $20,000.

P. & A.'s NEW DIRECTORY.

The Pittsburg & Allegheny Telephone Company is about completing its directory for the coming year. It will contain a total of about 15,000 names, an increase of about 5,000 over those in the old directory. Nothing could more conclusively show the growth of the company. In addition to the largely increased list of patrons the new directory also includes a list of towns which are now in the service of the P. & A., which were not reached by the company a year ago. These include Uniontown, Connellsville, Somerset, Johnstown,, Waynesburg, Cumberland, Morgantown, and practically all points in Cambria, Somerset, Westmoreland, Fayette and Greene counties, in Pennsylvania, and an extensive district in Western Maryland. These lines will be completed and in first-class working order by the time the new directory is ready for distribution, which will be about January 1, 1904. The rates to these points also show substantial reductions over what the public has been accustomed to paying.

OPERATORS HAVE FIRE DRILL IN INDIANAPOLIS.

An Indianapolis, Ind., exchange one morning last week shut off all traffic for two minutes and four seconds while the operators practiced a fire drill. At the sound of the alarm all the operators disconnected their head sets and took a position behind their chairs facing the exit. This took four seconds, and the sixty operators were ready to march downstairs in a double column. It took fifty-seven seconds more for them to go downstairs to the retiring room, and fifty-four seconds to march back to their places at the switchboard. In another nine seconds the operators were again at work. During the time that the boards were deserted eighty-seven calls came in. All operators were instructed to report to the chief operator any complaints or comments on the delay in the service. It was found necessary to explain to only one patron, who accepted the explanation with good grace.

CUYAHOGA'S NEW SWITCHBOARD.

It is expected that the new switchboard for the Cuyahoga Telephone Company will arrive in Cleveland in a few days and the work of installing it will commence at once. It is probable that it will be in shape for operation by the first day of February next.

The Editor's Page.

SOME NEWSPAPER TECHNOLOGY

OUR esteemed contemporary, the Chicago *Chronicle*, in a recent editorial indulges in a somewhat pessimistic view of the value of the telephone to 20th century communities. The paragraph in question makes the following somewhat singular statement:

"A large mortality for several years on railroad trains, boat lines and trolleys is due in part to the attempt to make the telephone do the work which can be reliably done by only a less sensitive agency."

It would certainly seem that there is some mis-application in such a statement. There are few of the steam railway systems in this country which use the telephone for train despatching. We do not know of any boat lines that have telephonic stations along their water route. Electric railways, however, have employed the telephone to a great extent in the place of the telegraph. Its use in this direction is constantly growing, and we have never yet seen any statistics that point decisively to any catastrophe which has originated from the use of the telephone for these purposes. On the contrary, it is pretty safe to say that many accidents have been avoided for the very reason that the telephone is quicker than the telegraph, and it is understood by anyone without the necessity of a skilled operator. Perhaps the *Chronicle* has in mind the recent accident upon the Boston & Western, but testimony regarding this unfortunate calamity taken before the highest tribunal of the State, the railway commission, developed the fact that the train dispatcher gave his orders correctly to the motorman, who both received and understood them, but he did not obey them, and the accident resulting was entirely due to a violation of orders, and not to the failure of the telephone to transmit them correctly.

We would almost venture to challenge the *Chronicle* to produce any evidence fairly acceptable to an impartial tribunal which would go to prove that telephonic instructions were not always correctly understood, no matter what the subsequent evidence might develop. A little later the article states: "Electricity, however, remains the essence of mystery. We know no more in fact of its origin and nature than did the ancients preceive its existence. No device with human creative power eliminates from the electric problem the secret of its substance and no resource promises to make its employment independent of influences beyond human control. Derangement, dislocation and destruction of electrical appliances by forces occult or intangible, or, if tangible, volatile, continue to render electrical science obscure, although never more resolute and optimistic than at this moment."

In a sense, electricity is a mystery; so is everything in the Universe. We know no more to-day of the actual nature of gravitation than was known at the beginning of creation. We are entirely ignorant of the ultimate constitution of a drop of water, so that in this sense, everything in creation is shrouded in an impenetrable darkness. But we do know, and know more thoroughly the laws that govern the application of electricity than those which accompany any other phenomenon in nature. Newton stated the law of gravitation as being directly proportional to the quantity of matter, and inversely proportional to the distance between any two objects. Ohm's law, which asserts that the quantity of electricity in any circuit is proportional to the electrical pressure, and inversely proportional to the resistance is just as true, just as definite, just as well understood an annunciation as that given by Newton. It is exactly as easy for us to control the operation of an electrical circuit as it is to control the operation of gravitation.

AN INTERESTING REVELATION?

In many respects electricity has been more carefully and completely stated than any of the other so-called natural forces. Its flexibility and its adaptability to the uses of mankind are so great as to have presented the keenest stimulant to research, and as a result electrical engineers to-day are more certain in their calculations, and can work with a closer margin than their brothers in either the mechanic, the civil, or the mining professions. The steam engine is as old as electricity, but we venture to assert that the annual mortality from boiler explosions is a hundred fold greater than that from all electrical agencies put together.

THE ELECTRICAL DISTURBANCE

THE recent electric storm which visited nearly all of the Northern Hemisphere developed some very interesting phenomena. In the Northwest, from St. Paul to Dickinson, N. D., an experiment was tried during the Aurora of disconnecting the telegraph battery from the line, and the operators succeeded for several hours in sending messages over 650 miles by the earth currents without the aid of any source of electricity. At many other points the earth currents were so strong as to occasionally interfere with the operation of telegraph lines by neutralizing the battery currents, or else, if the earth currents were in the same direction as those from the battery, there was so much electrical power as to cause the instruments to become unmanageable, and even caused frequent injury. Magnetic storms of this description are more frequent than is often supposed. They almost invariably occur during any period of solar disturbances, and just about the time of the recent Aurora disturbance, a group of unusually large sun spots made their appearance and slowly drifted across the disc of the sun. It has been so far substantiated that there is an intimate connection between solar phenomena of the magnetic condition of the earth that there is little doubt of the possibility of sending signals across inter solar space, and so Mr. Tesla's famous idea of signaling Mars is not theoretically impossible. The only difficulty seems to be to get an electric generator big enough to cause a disturbance great enough to be felt at so remote a distance.

FEDERAL EXCHANGES ABANDONED

By H. A. Lane, *Special Correspondent.*

THE Federal Telephone Co., of Pittsburg, Pa., has once more displayed its pitiable inability to longer make a show of life in fourteen of the most prominent boroughs of Allegheny and adjacent counties. Early in November its "exchanges" in these places were closed by order of Manager Fred Deland, his advisers having deemed it no longer wise to make a further show of fight. Accordingly, the instruments, consisting in nearly every case of battered and worn out machines that had been cast aside in large city offices, were removed. The operators, about twenty in number, whose practical sole duty had been to "bottom chairs," were discharged. There was no funeral, it was simply a case of gone without friends and few took interest in the matter to notice the absence of the "exchanges."

The boroughs which were thus robbed of the able assistance of the Federal Telephone Company in helping the Bell company in its endeavor to keep the Pittsburg & Allegheny Company out of the field are the following: Avalon, Bellevue, Ben Avon, Emsworth, Glenfield, Haysville, Osborne, Leetsdale, Economy, Freedom, Coraopolis, Aliquippa, Monaca and McKees Rocks. They comprise a string of flourishing towns lying on both sides of the Ohio River below Pittsburg and have a population of perhaps 50,000 people. They are under no obligation to the Federal company for past favors. On the contrary a big majority of the inhabitants were never aware of the fact that the Federal had a line into their borough and the remainder rarely attempted to use the Federal lines. The "exchanges" in some cases were put up in woodsheds or other outbuildings and the list of subscribers in more than one borough could be counted on the fingers of one hand. The pole lines were not molested, nor were any franchises surrendered when the "exchanges" were abandoned, thus leaving a stumbling block in the way of the Pittsburg & Allegheny Company.

In connection with the closing of practically all the Ohio valley offices, Manager Fred Deland, of the Federal Telephone Company, gave out the following statement for general publication: "Our board of directors has temporarily closed fourteen Federal exchanges because the repeated refusals of the Pittsburg & Allegheny Telephone Company to join any movement that would inflict direct injury on the Bell Telephone Company by the building up of a good telephone service which destroyed the possibility of our receiving any income from these exchanges. The total cost of operating and maintaining these exchanges during the last twelve months was $9,503.71, while the total income derived from the entire fourteen was only $10.95. Then the present condition of the money market did not justify the sacrifice that was being made in the hope that the Pittsburg & Allegheny Telephone Company would ultimately perceive how ably it was aiding the Bell Telephone Company to kill off all competition."

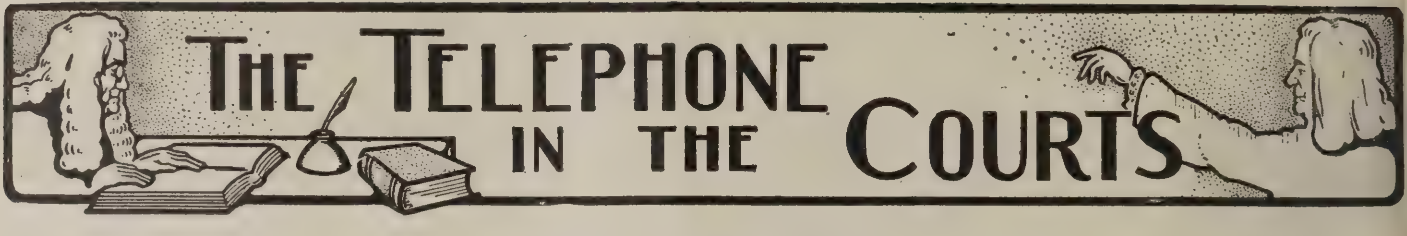
"This does not mean," continued Manager Deland, "that we are not increasing our service in other directions. We will rebuild our exchanges in Westmoreland, Fayette and Washington counties, as we are now doing. We are now building a line from Greensburg to Youngwood, Pa., and completing a new line from Washington to Claysville, Pa. We are also putting in a new line from Canonsburg to McDowell by way of Bishop, Cecil and Reissing, Pa., and our new exchange at Jeannette is almost done."

There is a wonderful contrast between the energetic manner in which the Pittsburg & Allegheny Telephone Company goes after business and renders service after the same has been secured and the methods of the Federal Telephone Company which consist in allowing healthy Independent plants to die out after they have been bought, of constructing pole lines upon the only available highways in localities in which they obtained franchises but never going any further or making any effort to build up business so as to make them a paying investment. The Pittsburg & Allegheny Telephone Company has absolutely ignored the Federal Telephone Company in its pretended desire to obtain Pittsburg connections and holds that if the Federal would connect with it if opportunity were offered it would be done with the sole idea of rendering such miserable service that the connections would amount to naught and thus make a farce out of what ought to be first class service thoroughly able to compete with that rendered by the Bell company.

It is a curious fact that out of all the many Independent telphone companies in Western Pennsylvania only one has allowed its lines to be connected with those of the Federal and that was done under a contract containing a 30 days' cancellation clause. The Federal company has been turned down by the Johnstown Telephone Co., by the Tri State Telephone Co., operating in Uniontown and Connellsville, and by the National Telephone Co. of Wheeling, W. Va.; all of which are the leading Independent companies, with the exception of the Pittsburg & Allegheny company in Western Pennsylvania and West Virginia. On the other hand in spite of the statements of Manager Deland, that the P. & A. compay "would ultimately perceive how ably it was aiding the Bell to kill off all competition" that company has connections with the United States Long Distance Telephone Co., thus giving its subscribers service throughout the state of Ohio; with the Union Telephone & Telegraph Co. giving service to Erie, Pa., and all intermediate points covering ten counties in northwestern Pennsylvania; and with four or five smaller Independent companies. It has traffic agreements executed with the Johnstown Telephone Co., operating in Cambria and Somerset counties, Pa., and with the Tri State Telephone Co. with headquarters at Uniontown, Pa., which covers Fayette and Westmoreland counties. Its connections with the two latter companies will be completed by means of standard lines before January 1. Thus it can be seen that not only is the Pittsburg & Allegheny Telephone Co. doing everything in its power to render first class long distance and local service such as will compare most favorably with the service of the Bell Telephone Co., but it is also very hard for its officials to see that a connection with the Federal Telephone Co. would be of the slightest possible advantage even if it were convinced that the Federal were sincere in its statements. The only plant in which the Federal company has telephones enough to make a connection desirable for the P. & A. company is in McKeesport, Pa., but in this town the latter company has about completed its new plant at a cost of over $200,000. Therefore a connection with the Federal at that point would be of no value to it.

DIRECTOR A CORPORATION OFFICER.

THAT a director is an officer of a corporation within the meaning of Section 525 of the Code of Civil Procedure, which provides that the verification of a pleading by a corporation must be made by one of its officers, is the decision of the Appellate Division of the Supreme Court of New York in the Third Department in the case of Samuel Eastman against the York State Telephone Company. The court said, per curiam: "In Bigelow v. Whitehall Manufacturing Company, 1 City Court Rep. 138, Judge McAdam held that a director was an officer of a corporation within the meaning of this provision. This decision was made in 1879. As far as we have been able to ascertain, the decision has never been questioned and has been accepted by the profession as a correct interpretation of the word 'officer,' as thus used in the statute. A director has frequently been referred to in the decisions of the court as an officer of a corporation, and the statutes themselves often refer to directors as officers. Whatever might be our views, were the question an original one, inasmuch as for over twenty years the accepted interpretation of the statute has authorized a director to verify the pleading of a corporation, we think it would be unwise now to hold otherwise." 2 Eastman v. York State Telephone Co., 83 N. Y. Supp. 1019.



THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

DUTY TO KEEP IN GOOD REPAIR.

OUR lines are getting out of repair, but the village authorities refuse to grant us permission to repair them. They want to force us to accept a modification of our franchise. What shall we do? We dare not let our lines remain as they are, for they do not give good service and are in danger of falling and perhaps injuring some one. F. S. P.

It is your duty to keep your lines in good repair and the refusal of the local authorities to permit repairs is no excuse for you. First, ascertain whether their permission is necessary. This will not be the case unless your franchise or some ordinance or statute, by which you are bound, so provides. Second, if permission of the village authorities is needed, formally demand that such permission be given you. Third, bring suit for mandamus to compel them to issue the necessary permit. It is incumbent on your company to take this course and exhaust every legal remedy to compel the issuance of the permit. Otherwise you will be liable for whatever damages are occasioned by the condition of your line. See U. S. Illuminating Co. v. Grant, 55 Hun. 222, 3 Am. Elec. Cas. 95.

A QUESTION IN TAXATION.

IS it legal for a city to pass an ordinance making a telephone company pay one dollar for every telephone pole they set up in the city streets? D. J. T.

It is difficult to answer a question upon the validity of an ordinance without knowing its language and all its terms. Upon the general proposition, the writer would say, however, that such an ordinance would be lawful, not as a tax upon the property or business of the company, nor even as a privilege or license tax, but because it is in the nature of a rental or pecuniary compensation to the general public for the use of that part of the street exclusively occupied by the poles. This was the decision of the United States Supreme Court in the case of St. Louis v. Western Union Telegraph Company, 148 U. S. 92, 149 U. S. 465.

REASONABLENESS OF RATES TO BE DETERMINED.

JUSTICE BARNARD, of the Supreme Court of the District of Columbia, has given an opinion in the case of J. Forrest Manning and others against the Chesapeake and Potomac Telephone Company. The case was remanded by the Court of Appeals, as the United States Supreme Court had ordered, with directions that the District Supreme Court set aside its former ruling on the bill and investigate the reasonableness of the rates fixed by the act of Congress of June, 30, 1898. The direction was also given that the investigation be conducted "in the light of the construction given by the Supreme Court of the United States to the statutes."

Under this order of reference evidence was taken as to the classes of telephones as provided, and the cause was heard upon that issue alone. The court was then asked to determine, as a preliminary matter, what kind of telephones, equipment and service was meant by Congress in the act establishing rates to be charged. This question, said the justice, was to be answered from all the evidence now in the case, and in the light of the construction given to the act by the Supreme Court of the United States in its opinion delivered by Mr. Justice Brewer. This latter opinion, Justice Barnard holds, leaves practically only one question for the determination of the District Supreme Court at this time and that is: Was it the intention of Congress to fix the rate to be charged under the act for the less expensive and inferior equipment, or for the more expensive and more reliable equipment?

It was conceded by counsel in argument that what the Supreme Court of the United States referred to by the use of the words "two kinds of equipment," etc., was the telephones connected by the single iron or steel wire, called the "grounded circuit," and those connected by the double copper wire, called the metallic circuit, the former being used for local communication only, and the latter for long-distance as well as for local service. Justice Barnard took the view that Congress never intended by its legislation of June 30, 1898, to establish a rate for anything but local service in the District for business and residence purposes, and was not therefore concerned about long-distance equipment. He says he is forced to the conclusion that the statute in question was intended to be applicable only to the ordinary telephone equipment and service then used in the District, known as the "grounded circuit" or "local service equipment," and that it does not apply to the "metallic circuit" or "long-distance" telephone and its more expensive and efficient equipment and service.

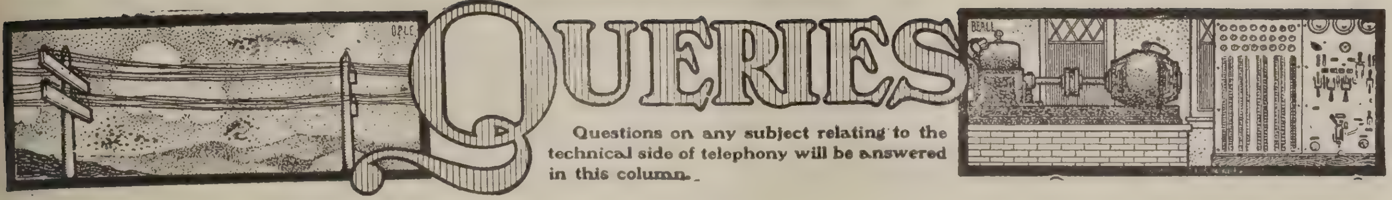
A RULING AS TO SIX-PARTY LINES.

THE Railroad Commission of Louisiana, sitting at New Orleans, has passed adversely on the application of the Cumberland Telephone and Telegraph Company for permission to abolish its six-party lines. No reasons are given for the decision but the application was refused peremptorily. The application was based on assertions by the company that the system was put in merely as an experiment, had been fruitful of unsatisfactory service only, and was a financial loss to the company. The contention was answered with the charge that the service was made unsatisfactory by the negligence of the company.

At the same meeting of the commission, three other measures that the company put forward as a means of relieving itself of the obligations of its franchise were taken up, all of them being opposed by the Municipal Government Committee of the Progressive Union. The other measures that were threshed out were the application for a reduction of the telephone radius in New Orleans and other cities; the abolishing of the two cent per message telephone in New Orleans and an application for greater rights in the making of contracts for a service. To the last mentioned measure there was no opposition and the commission passed on it favorably. Under the decision the company is granted authority for a rate of $1.25 per mile for a direct metallic circuit service for distances outside of three miles and within twenty miles. A change is also allowed in the contract for service. The company may enter contracts for service for one year, provided they pay all costs of installation. Parties desiring service for less than one year will receive it upon payment of the actual cost of installing the telephone.

A COMPOSITE NAME.

THE Hanamo Telephone Company, which runs out of Maryville, Mo. has a name which has caused a good deal of guessing as to its origin. Hanamo is composed of the initial letters of the counties through which the lines first ran—Holt, Atchison, Nodaway, and Andrew—and the abbreviation for Missouri, "Mo."



Questions on any subject relating to the technical side of telephony will be answered in this column.

CONDENSER AND RETARDATION COIL.—(239.)

In a recent query (No. 218) in your paper, a method was described which, by using a condenser and two retardation coils, kept the commutator hum from the storage battery charging generator from affecting the lines. Will you please explain how these two appliances give the desired effect?

N. A. H.

The use of a condenser and a retardation coil in the circuit of a generator for charging a storage battery or a similar apparatus in an exchange in order to prevent a noise, may be explained by reference to Fig. 239, in which *G* is the generator, *C* a condenser bridged across the line between the generator and the retardation coils *R'* and *R*. In all cases of this kind the objectionable noise in telephone lines is produced by what is called commutator sing, that is to say, as each commutator bar passes under the brush there is a slight pulsation in the current, and this appears in all receivers as noise. The retardation coils *R'* and *R* operate to choke back inequalities, to smooth out the current and make it more nearly uniform, and in so doing the retardation coil operates very much as a dam to a current of water, namely: it prevents the electricity from traversing the line and piles up the current back of it. The condenser operates as a kind of a reservoir, and serves to allow the pulsations which are choked back by the retardation coil a place in which to accumulate. For example suppose a wave of slightly higher potential than usual to be emitted by the generator which tries to pass the retardation coil but is held back; it then overflows into the condenser and fills it up. If a fraction of a second afterwards there is a pulsation of a little lower potential, then the condenser discharges and tends to raise the potential. The coil and condenser are therefore complimentary to each other, one serving to prevent inequalities from escaping into the line, and the other as a reservoir into which these inequalities can flow.

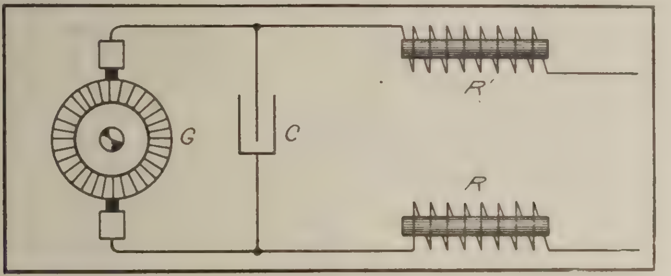


Fig. 239.

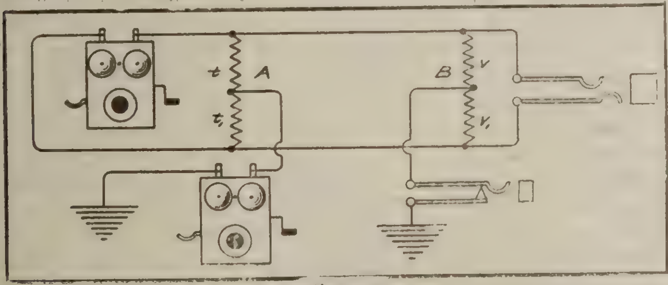


Fig. 240.

A DUPLEX LINE QUESTION.—(240.)

Will you kindly advise me how two subscribers may be connected on a metallic circuit by means of a repeating coil placed on the pole where they branch off and both work as though there were two independent lines?

N. A. B.

We presume you refer to the method of constructing a metallic line duplex so that two conversations may be carried on simultaneously. The general arrangement is shown in Fig. 240. It will be noticed that one circuit uses the earth as a return. In the circuit shown *A* and *B* are split retardation coils in which t must be exactly equal in turns and resistance to t_1 and v must be exactly equal in turns and resistance to v_1. Either circuit will operate without interfering with the other provided the metallic line is perfectly balanced. The two jacks indicated may be in the same exchange or in different exchanges and the telephones may also be located at any points desirable.

RINGING A BELL OVER THE LINE.—(241.)

No. 1. What would be the best way to connect a large battery call bell to an exchange line?

No. 2. Would it be possible to connect a battery call bell on one side of the telephone line and ground the other side (to work a push button at the exchange) without putting any ground or disturbance on the local line. Would a condenser do any good?

It is somewhat difficult to answer your question because it does not state for what purpose the bell is to be used. In answer to No. 2, Fig. 241 shows a method by which a battery bell could be connected to one side of an exchange line and ring over the ground. If the bell were high-wound, say 250 to 500 ohms, there would, under no circumstances, be any objectionable noise introduced. A condenser could not be used in connection with the battery bell.

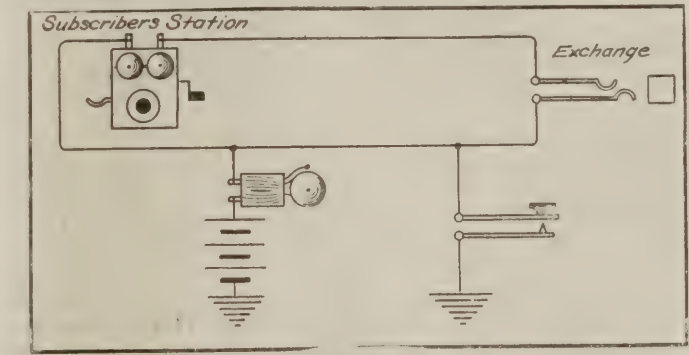


Fig. 241.

SOME TRAFFIC QUESTIONS.—(242.)

Will you kindly give me information as to the registering of calls on measured service when this is done at the central office entirely. That is to say, there is no register at the subscriber's instrument, and he gets central in the ordinary way? Also will you kindly give me information as to how peg counts are usually taken by both the Bell and Independents?

N. O. B.

The registering of calls on measured service is sometimes done by meter and sometimes by what is called ticket-making, that is to say, each operator makes a memorandum of the subscriber who calls and often the subscriber who is called. There have been a great variety of forms designed for this purpose, but none of them have as yet been entirely satisfactory. We imagine that the ticket method is in use in the exchange that you mention.

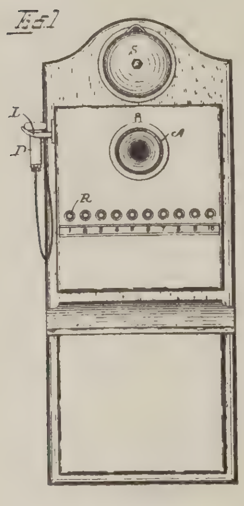
Where the meter method is in use there is a button associated with each pair of switchboard cords and a meter associated with each measured service line. When it is desired to register a call on a certain line the meter button is pressed, associated with the pair of cords which is used in that particular call. This will operate the meter which is usually one of a bank of many located in the terminal room.

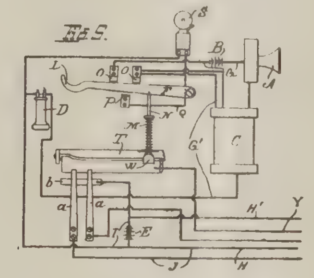
To give you full information as to making peg counts would require more space than can be devoted in the query column. Some articles upon this subject will be published in the near future in this paper.

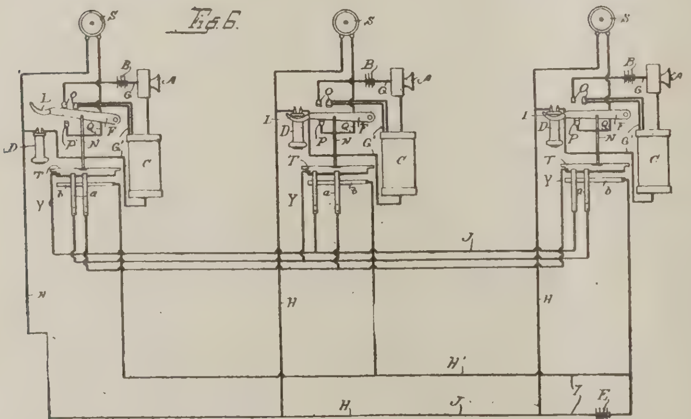
PATENTS ISSUED

PRIVATE TELEPHONE SYSTEM.

Thad J. Seeley and Charles Hemsing, of Milwaukee, Wis., patent (No. 744,117) a private telephone system. The invention relates particularly to telephone systems of the intercommunicating type, the principal feature being the method employed for signalling between stations. Fig. 1 shows a front view of the instrument; Fig. 5, a diagrammatic view of the operative parts, and Fig. 6, a wiring diagram for three stations connected together. The arrangement of the local circuit at the instruments is the usual one and needs no explanation. The method of calling and establishing a connection is as follows: The push button corresponding to the desired station is depressed at the calling station, the circuit closing arm is brought into contact with the electrode *b*, and the circuit thus closed from the battery *E* through the call bell at the distant station. As the arm *F* is pushed forward it is brought into contact with the tilting bar *T*, swinging it forward until *F* passes beneath it. When *F* is released from the pressure of the push button it comes into contact with *T* and thus the instruments are connected through the circuit *J*. By replacing the receiver upon the hook, *F* is released from contact with *T* and normal conditions are restored.

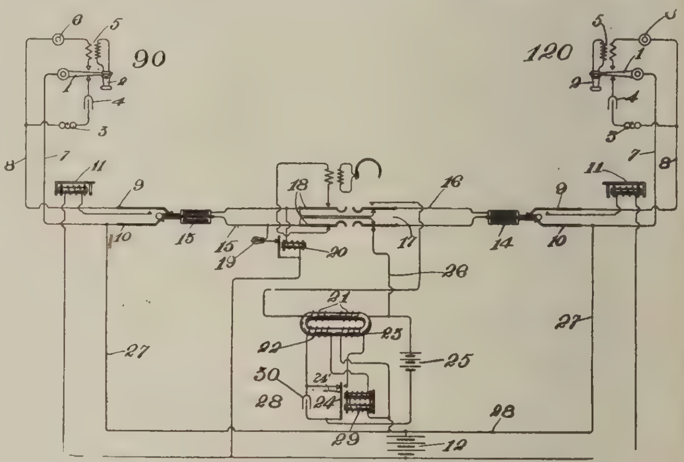






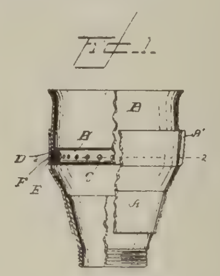
COMMON BATTERY SWITCHBOARD CIRCUIT.

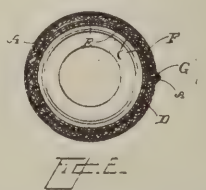
J. F. Molthauer, of Minneapolis, Minn., patents (No. 743,532) an improved switchboard circuit. This is shown in the accompanying illustration. The improvement claimed by the inventor is the ability to operate this circuit without the use of alternating currents. This he accomplishes by providing the apparatus *29*, which resembles a vibrating bell, that is to say, it is an automtic magneto circuit breaker. This circuit breaker is connected with the transformer *22*. When the circuit is in operation pulsations of electricity are sent through this circuit. By means of the transformers these are converted into alternating currents and are used for ringing or any other exchange purpose.



A DISINFECTING APPLIANCE.

Maurice Griffen, Sylvester Sanher and Boyd Keith, of Riverside, Cal., patent (No. 744,337) a method of disinfecting transmitter mouthpieces. Fig. 1 shows a side elevation, partially in section of the arrangement, and Fig. 2 shows a cross section on line *2-2*. A wick *F*, saturated with disinfecting fluid is placed within the grooved ring *D* and the disinfecting vapor conveyed to the mouthpiece by means of the perforations *C* and *E*, which are turned to coincide while the transmitter is in use. During the time that the telephone is idle the shell *B* is rotated so that the perforations do not coincide and the escape of the disinfectant thus prevented.





SYSTEM OF ELECTRICAL COMMUNICATION.

James Tarbottom Armstrong and Axel Orling, of London, England, patent (No. 744,000) a system of electrical communication. The object of this invention is to provide a receiving instrument which will respond only to signals of a given pitch. The general arrangement of the device is shown in the figure. The received impulses energize the telephone magnet *9*, which operates the carbon transmitter *t*, which by changing its resistance, varies the current flow through the receiver *v* and causes its diaphragm to vibrate. A sensitive flame is located within a tuned chamber *4*, which excludes all sound vibrations but those of a definite pitch. When vibrations of the proper pitch are transmitted to the chamber *4* the flame *y* is shortened and brought out of contact with the wire *z*, which, becoming cooler, lowers its resistance and allows sufficient current to flow through the relay *3* to operate it and in this way display or sound any desired signal. In figures 2 and 3 detail drawings of the arrangement are shown.

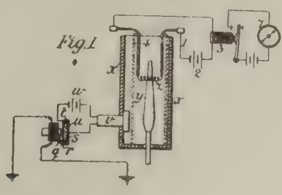


Fig.1

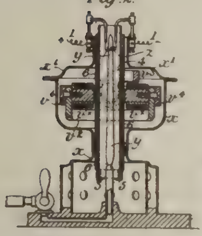
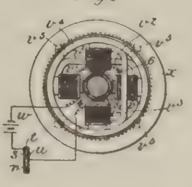
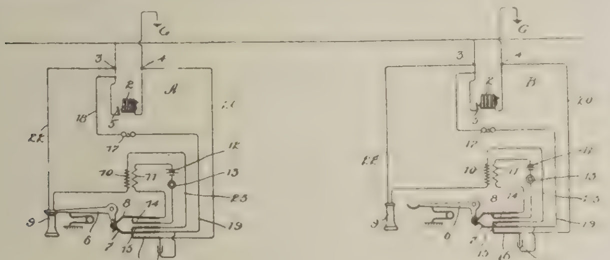
Fig.2


Fig.3


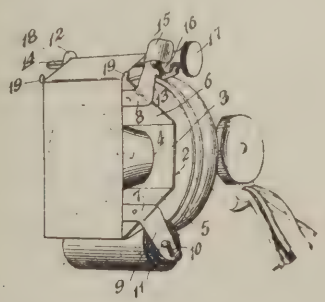
IMPROVED SUB-STATION CIRCUIT.

G. Babcock is granted a patent (No. 743,421) for animproved sub-station circuit. This is shown in the figure. The object of this circuit is to so arrange the sub-station circuit that the condenser, *27*, may be cut out when line is not in use and thus be protected from lightning discharges or other injury. The circuit is so obvious that no further description is needed.



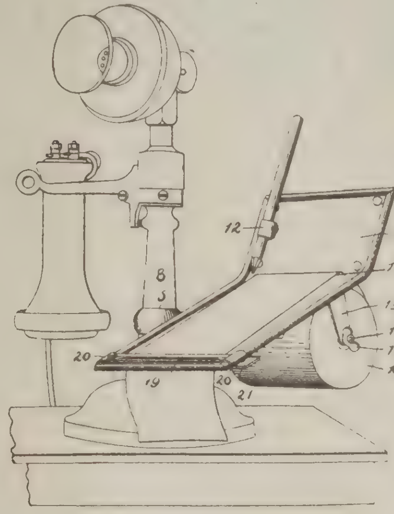
TELEPHONE HYGIENIC APPLIANCES.

Horace L. Cutter, of Los Angeles, Cal., patents (No. 744,497) a telephone hygienic appliance. The figure shows a perspective view of the device applied to a transmitter. The frame, *2*, fits the mouthpiece as shown, and causes the hygienic strip which is wound on the axle *11*, the axle having bearings in the arms *9* as shown. The strip is passed over the carrier *2* and fastened to the spindle *14*, around which it is wound as desired. The spindle *14* is prevented from backward movement by means of the springs *15-16*. The operation of replacing a used roll by a new one involves little difficulty as will be apparent from the figure.



TELEPHONE TABLET ATTACHMENT.

George M. Uric and Andrew A. Markham, of Kansas City, Mo., patent (No. 743,996) a telephone tablet attachment. The general arrangement of the device is shown in the figure. The tablet is formed of sheet metal, is rectangular in shape, the sides and ends having headed edges. The tablet is provided with a pencil holder as shown, and a roll of paper. The paper may be pulled through the bottom of the holder and torn off as desired. The tablet is adjustable to different angles and is also capable of lateral adjustment and is made to fit different forms of instruments.



CABLE HOLDER FOR MANHOLE.

Hugh C. Baker, Jr., of New York, N. Y., patents (No. 743,805) a cable holder for manholes. Fig. 1 shows a sectional view of a manhole equipped with the device and Fig. 2 shows a section on line *2-2* of Fig. 1. The holder consists of two segmental members c^2, provided with shanks c^3, connected by a pin c^4, the adjacent surfaces of the shanks forming the opening c^5 as shown, through which the bracket support passes. The application of the device is obvious.

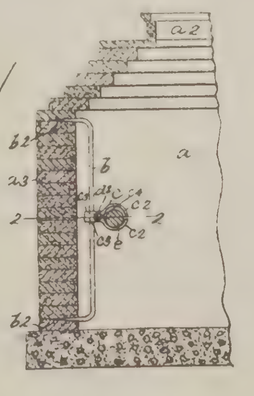
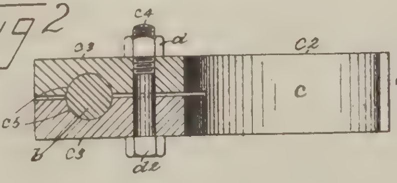
Fig 1


Fig 2


The Week's Messages.

FINANCIAL

LOGAN, IA.—The Woodbine Telephone Company has increased its capital stock of $25,000 to $50,000. The officers of the company are G. H. Kibler, president; S. B. Kibler, treasurer; H. A. Kenney, manager; M. A. Reade, secretary.

BOSTON, MASS.—The report of the Mexican Telephone Company is as follows:
ports these operations for the year ended September 20, 1903: Earnings, $351,865; expenses, $155,159; net, $196,706; taxes, subway rental, etc., $28,426; interest on first mortgage, $50,000; interest on general mortgage, $34,489; surplus, $83,790.

BOSTON, MASS.—The report of the Mexican Telephone is as follows:

August.	1903.	1902.	Changes.	
Gross earnings..............	$22,875	$20,362	Inc.	$2,513
Operating expenses..........	11,037	12,696	Dec.	1,658
Net earnings............	$11,837	$7,665	Inc.	$4,172
Six months ended August 31:				
Gross earnings..............	$135,924	$119,030	Inc.	$16,894
Operating expenses..........	69,020	65,446	Inc.	3,574
Net earnings............	$66,904	$63,583	Inc.	$13,320

Gain since March 1, subscribers 234.

ANN ARBOR, MICH.—The Washtenaw Home Telephone Company has filed the trust mortgage for $250,000 on its properties to secure the issuing of that amount of 5 per cent. twenty-year gold bonds. The mortgage is to the Luzerne County Trust Company, of Wilkesbarre, Pa.

MINNEAPOLIS, MINN.—The directors of the Tri-State Telephone & Telegraph Company has declared a regular quarterly dividend at the rate of 6 per cent. per annum.

BROOKVILLE, OHIO.—The Brookville Telephone Company has increased its capital stock from $6,000 to $10,000. J. C. Snyder is president.

LUZERNE, PA.—The lower Luzerne Telephone & Supply Company has increased its capital stock from $7,500 to $20,000.

FAIRVIEW, TENN.—The Fairview Telephone Company has increased its capital stock from $1,250 to $5,000.

FRANCHISES

GREENWOOD, ARK.—The city council of Greenwood has granted a franchise to J. H. McConnell to construct and operate a telephone system for a period of fifteen years.

AZUSA, CAL.—The representatives of the Covnia Home Telephone Company appeared before the city trustees recently and asked for a modification of the franchise which was granted them.

CEDAR FALLS, IA.—It is understood that R. A. Davison, who recently was granted a telephone franchise by the city council of Waterloo, will ask the local city council for a franchise.

COUNCIL GROVE, KAN.—The Council Grove Telephone Company has been granted a franchise for a telephone system at Dunlap, and expects to begin construction at once. The company will build rural lines out of Dunlap.

ST. CLAIR, MICH.—The common council has granted a telephone franchise to H. R. Baird and W. R. Baker. It is understood that a system will be established at St. Clair with connection to Port Huron, Marine City, Algonac, and other points.

CRETE, NEB.—At a recent meeting of the city council, the Crete Telephone Company, represented by Mr. Merrill, and the Sailing Telephone Company, represented by Mr. Neunmaker, applied for franchises. The council voted unanimously to lay both ordinances on the table.

PALOUSE, WASH.—The city council has granted a twenty-year franchise to the Inter-State Co-operative Telephone Company to operate a telephone system here.

COMBINATIONS

HILLSBORO, ILL.—The directors of the Peoples' Mutual Telephone Company held a meeting recently and approved the purchase of a line running from Harvell to Farmersville and Girard for $1,500.

ELWOOD, IND.—Mr. Thomas Bromley, Jr., of Muncie, general manager of the Delaware and Madison County Telephone Company, with the local manager, were at Tipton recently inspecting the property of the Tipton Telephone Company with a view of purchasing it.

ELECTIONS

OTTAWA, CAN.—The Canadian Telephone & Telegraph Company has elected the following officers: Charles Robinson, of Scranton, Pa., president; Robert Bickerdick, M. P., Montreal, Can., vice-president; F. J. Stegmaier, of Wilkesbarre, Pa.; N. F. McCreay, M. P., Winnepeg, Can.; Geo. Froler, M. P., Sussex, N. B., Can.; Jas. R. Mears, Scranton, Pa., secretary; John F. C. Thompson, Ottawa, Can., manager; T. J. Leonard, New York City, directors.

TRILLA, ILL.—The stockholders of the Mutual Telephone Company met recently and elected Wm. Beals president of the company.

CANAWHA, IA.—The Hancock County Telephone Company has elected the following officers: E. L. Stilson, president; A. L. Severin, secretary; E. C. Abbey, treasurer and manager; C. M. Gowdy, W. P. Chambers and Walter Wildman, directors. The company will declare a dividend the first of the year. A great many improvements are being made by the company and favorable connections have been made with other Independent companies in the State.

PLATTSBURG, N. Y.—The Clinton Telephone Company, which will construct a telephone system here, has elected the following officers: I. H. Riswold, president; B. S. Ramsey, vice-president; J. S. G. Edwards, secretary, and I. Merkel, treasurer. The other directors are J. M. Wever, Edward S. Parkhurst and Chas. B. Knox.

CROOKSVILLE, OHIO.—The Crooksville Telephone Company held a meeting at Columbus recently and elected the following officers: J. H. Rhodes, president and general manager; H. A. Skidmore, vice-president; Wm. Harris, secretary, and J. L. Bennett, treasurer.

SHEBOYGAN, WIS.—The Citizens' Telephone Company has elected the follwoing officers: W .E. Talmadge, president; Gustave Huette, secretary, and Fred Karste, treasurer.

PERSONAL

GEORGE E. BERNECKER, manager of the exchange of the Cumberland Telephone Company in Jeffersonville, Ind., will on December 1 take charge of the exchange in New Albany, Ind., and will thereafter manage both exchanges. Horace Gooch, who has been manager of the New Albany exchange, will go to Texas, where he will be in charge of an Independent telephone system.

W. W. BOSTWICK, Jr., formerly with the Lambert Schmidt Telephone Manufacturing Company, has been appointed New York manager for the Couch & Seeley Company, of Boston, Mass.

R. L. BURNS, manager of the B. & B. Telephone Company, of Hutchinson, Kan., reports that they have orders for over 150 telephones now on their books, which does not include telephones among the farmers, of which they have about forty. He will be obliged to keep a force of men at work all winter on rural lines in order to get caught up.

J. H. FILDEW has resigned as manager and secretary of the Union Telephone Company, of Alma, Mich., to take effect January 1. The position was tendered to W. H. Melcher, of Saginaw.

O. MORSMAN, who has been engaged in the telephone business for the past nine years, and who has built some of the best exchanges in the Southwest, outside of St. Louis and Little Rock, and who has been prominently identified with the Missouri Bell Telephone Company for the past year, has resigned his position with that company to accept the position of general superintendent of the Independent Consolidated Telephone Company, of Wisconsin. Mr. Morsman is well known in Michigan and the East, where he formerly had a position with the United States Telephone & Telegraph Company. His Wisconsin headquarters for the present will be Dodgeville, Wis. He will have entire charge of the construction work, and supervision of the operation of the system controlled by the Independent Consolidated Telephone Company.

THE WEEK'S MESSAGES—Concluded.

J. A. SALMONS, local manager for the Cumberland Telephone Company, at Mayfield,, Ky., has been succeeded by Edwin Allen, Jr., of Pulaski, Tenn.

HARRY STEWART, of Chillicothe, Mo., is now manager of the central office of the Mutual Telephone Company, at Tarkio, having taken J. E. Johnson's place.

MISCELLANEOUS

INDIANAPOLIS, IND.—The Indianapolis telephone companies are of the opinion that the germ trouble is more easily overcome by washing the receivers and transmitters in any one of a dozen widely used antiseptic fluids. One of the companies is doing something in a sanitary direction by using individual transmitters, to be worn by the operators.

POCOHONTAS, IA.—The Mutual Telephone Exchange in this city was completely destroyed by fire.

BOSTON, MASS.—The American Telephone & Telegraph Company reports for October:

	1903.	1902.	Increase.
Gross output	111,749	92,601	19,148
Returned	49,885	37,155	12,730
Net output	61,864	55,446	6,418
From December 20 to October 31:			
Gross output	923,978	900,935	23,043
Returned	408,716	383,844	24,872
Net earnings	515,262	517,091	*1,829
Total outstanding	3,665,582	3,042,697	622,895

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* Decrease.

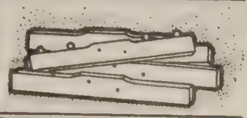
SAN ANTONIO, TEX.—The San Antonio Telephone Company will hold a meeting here on November 25th for the purpose of electing directors and transacting general business. H. M. Daugherty is president, and D. A. Walker, secretary.

UNDERGROUND

ATLANTA, GA.—The Southern Bell Telephone Company has petitioned the city council for the right to lay underground ducts for their wires on certain downtown streets. The ordinance was placed on two readings, and referred to the street committee.

FORT DODGE, IA.—The Fort Dodge Telephone Company contemplates improving its lines. The downtown lines will be put underground.

New Construction in the Field



BIRMINGHAM, ALA.—The police commissioners have recommended that a new police telephone system with about fifty iron waterproof boxes be installed in this city. The Bell Telephone Company and the Home Telephone Company will be allowed to bid for the installation of the new system, the lowest bid being accepted.

PHOENIX, B. C., CAN.—District Manager Hodge, of Nelson, representing the Vernon & Nelson Telephone Company, is here and will build a new telescopic telephone system in town. Metallio circuits will be installed, and a new switchboard put in.

HAVANA, CUBA.—W. M. Talbott, superintendent of The Red Telefonica, states that the company is contemplating extensive improvements, including long distance connections through the island, and connecting with the exchange in Havana. Mr. Talbott estimated that about seven million dollars would be expended.

ATLANTA, GA.—The Seaboard Air Line Railway has installed a new telephone system between Athens and Atlanta, and it is now being tried as an experiment. If satisfactory, the whole system will be similarly equipped.

FAIRBURY, ILL.—Representatives of Livingston County rural lines met here recently to devise means for the connection of all the rural lines in the country. The lines south of Fairbury decided to install an exchange here to connect with all the other lines which run into Fairbury.

HOPEDALE, ILL.—The Mutual Telephone Company, of Hopedale, is constructing a new toll line. The company now has 205 subscribers, and will soon issue a new directory. It expects to install a new system of party line calls much simpler than the one at present in use.

PASFIELD, ILL.—W. R. Morne, of the Boynton Telephone Company, was here recently arranging for an extension of the line north to Curran.

RIDDLE HILL, ILL.—The new Boyington Telephone Company will extend its line to Riddle Hill.

CEDAR FALLS, IA.—Cedar Falls and Hudson have been connected by the Mutual Telephone Company. A new metallic line has also been completed between Parkersburg and Waterloo.

FERTILE, IA.—A telephone line will be constructed from here to Joyce.

MESERVEY, IA.—The Rural Telephone Company, of Latimer, has extended its line to Meservey.

WATERLOO, IA.—The Cedar Valley Telephone Company plans to rebuild its local exchange, installing either a central energy or an automatic system.

WOODWARD, IA.—The Peoples' Mutual Rural Telephone Company of this place, and the Marcy Mutual Telephone Company, of Ogden, will construct a new line connecting Woodward and Ogden.

MEDICINE LODGE, KAN.—The Medicine Lodge Telephone Company, of Medicine Lodge, will install new automatic switches at once. They were recently burnt out by fire caused by lightning striking the building in which the office was located.

NICKERSON, KAN.—The Nickerson Telephone Company has replaced its automatic system with a manual system having a capacity of 200 lines. The company expects to build several rural lines this winter.

SOUTH HAVEN, KAN.—The Farmers' Mutual Telephone Company, with a capital stock of $5,000, is constructing a rural line to Wellington by way of Rome.

WELLINGTON, KAN.—The Farmers' Mutual Telephone Company, of South Haven, the Ninniscah Valley Telephone Company, of Bell Plaine, and the Caldwell Rural Telephone Company, have arranged to construct their lines to this town and install an exchange.

BOWLING GREEN, KY.—The Home Telephone Company, of Bowling Green, Ky., is preparing to make extensive improvements of its service in this city in the near future. Three thousand feet of additional cable, representing an outlay of $5,000, has been ordered by the company and will be delivered here in a few days.

OWINGSVILLE, KY.—Subscriptions are being solicited for the establishment of a new local telephone system to be owned and operated by home people. Seventy shares at $25 per share have already been subscribed, and as soon as 105 shares are taken, the system will be constructed.

HARTLAND, ME.—The Hartford & St. Albans Telephone Company is constructing a line from here to Mainstream.

DIBLEY, MINN.—The Barnesville & Wolverton Telephone Company has decided to build 35 miles of additional lines in the coming year. The new lines will be run through Mitchell and Atherton townships, and as far east as Pelican Lake.

HOKAH, MINN.—A telephone line is to be built from across the Root River to connect with other farmers' lines running into Hocah.

MOTLEY, MINN.—A telephone line will be constructed from here to Leader.

TYLER, MINN.—Money is being raised for the construction and apparatus, and installing a telephone system here.

WHITE BEAR, MINN.—The Lincoln County Telephone Company, composed of local business men, is installing a telephone system at Lake Benton. It is also extending a line to Ivanhoe.

FULTON, MO.—J. C. Thornton, superintendent of construction for the Buffum Telephone Company, is here arranging for extensive improvements in the local system. A new switchboard will be installed, and a great many of the lines rebuilt and new lines built.

SPRINGFIELD, MO.—C. O. Trask, secretary of the Home Telephone Company, and Theodore Garry, president of the Home Telephone Company, of Carthage, have arranged for constructing a line to connect Carthage and Springfield.

WAYNE, NEB.—John Liveringhouse has been elected chairman, and Wm. Fisher, secretary, of a committee of citizens who will organize a local telephone company. A committee of five, consisting of F. M. Griffith, J. M. Ross, F. L. Nelley, W. H. Gildersleeve and Henry Kellogg, was appointed to investigate the subject and report at a subsequent meeting.

SOCORRO, N. M.—The Socorro Telephone Company is constructing a line to San Antonio.

DOWNSVILLE, N. Y.—E. V. Merrett will construct a telephone line from Downsville to Walton, connecting with the Walton Exchange, and also with Hamden and Delhi.

SODUS, N. Y.—The representatives of the Wayne-Monroe Telephone Company were here recently with a a view of installing a local exchange. There is at present a dilapidated Bell exchange which serves but a few subscribers.

TRADE NOTES

The Wharff Eaton Co., Inc., of 33-37 Wormwood Street, Boston, Mass., has changed its name to The Art Brass Company, Inc. This company manufactures brass signs of all descriptions and makes a specialty of brass telephone signs.

The American Steel and Wire Company, of New Haven, Conn., has issued a November edition of its booklet, Wire Rope and Fittings. It is really a handbook on wire rope and should be of considerable value to those who have much to do with that product. Properties of the different types and directions for splicing the different ropes are given among other things. There is a great deal of good, practical information given beside prices. The booklet will be sent on request.

The American School of Correspondence, at the Armour Institute of Technology, Chicago, Ill., announces that Mr. Kempster B. Miller, the well-known telephone engineer, author of "American Telephone Practice," is a member of its advisory board. The telephony course taught by the school was written by W. C. Boyrer, whose experience as an engineer in all branches of telephony is broad. He is thoroughly familiar with both the practical and the theoretical sides of the art, and is well qualified for the work which he had done.

The Chicago Writing Machine Company reports that arrangements have been made with practically all of the largest telephone manufacturers, and orders have been received from telephone exchanges in almost every state in the country. Among the manufacturers who now handle these instruments, mounting their own transmitters and receivers, are the Kellogg Switchboard & Supply Co., the Eureka Electric Co., the Stromberg-Carlson Telephone Co., the American Electric Telephone Co., and the Swedish-American Telephone Co., all with offices in Chicago. The Fort Dodge Telephone Co., of Fort Dodge, Iowa, has installed the Adjustaphone, and reports it absolutely satisfactory and that it is very much pleased with the contrivance.

The Stromberg Carlson Telephone Manufacturing Co., through its Missouri salesman, Mr. H. B. Hewitt, gives the following partial list of its sales in Missouri for the month of October: A 100 capacity switchboard, including telephones to the Texas County Telephone Co., Houston, Mo.; a 480 capacity switchboard to Pattonsburg Telephone Co., Pattonsburg, Mo.; an 800 capacity visual signal board to the Cameron Telephone Co., Cameron, Mo.; 400 telephones to the Clinton County Mutual Telephone Co., Lathrop, Mo.; 100 bridging telephones to the Trenton Telephone Co., Trenton, Mo.; also 100 series telephones to the same company; to Briggs & Melvin, Lancaster, Mo., 100 telephones; 4,000 feet 100 pair cable to Leach & McArthur, Chillicothe, Mo.

The American Electric Telephone Company of Chicago, considered the first two weeks in November remarkable because of the large number of small exchange switchboards shipped by it. The following is a partial list of the shipments: Carew, O., 100-line express; Monclove Coah, Mexico, 100-line express; Harris, Ia., 100-line express; Belleville, Kans., 100-line express; Chickasha, I. T., 100-line express; Burlington, Ia., 160-line express; Elk City, Okla., 100-line express; Hundred, W. Va., 100-line express; Knox City, Mo., 100-line express. Independence, Mo., recently ordered from the company a multiple switchboard equipment, consisting of a 3,000 line capacity, 500-line installed, common battery type, lamp signal equipment. This switchboard has been shipped, and the installers are on their way to Independence.

The W. J. Barr Manufacturing Company, of 24-32 South Water street, Cleveland, Ohio, is putting on the market a line of cast iron telephone cabinets for interior and central energy telephones. They are well finished and indestructible and when equipped make a handsome instrument. The different sections of each cabinet can be taken apart by simply loosening screws. The screws are not taken out. The sections can then be taken to the department where the assembling is to be done. For instance the front plates are taken to the ringer department, the bottom plates to the hook switch department. Any piece forming the box will fit any backboard, therefore the cabinets can be shipped knocked down. The company also manufactures cast transmitter arms and other cast supplies for telephone apparatus. Concealed cord arms for interior telephones are made by the concern, of brass nickel plated and also of cast iron black enameled.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOU USE THEM EVERY DAY.—Toll Tickets for Independent Companies. Five thousand, 3 colors, prepaid, $2.50, cash with order. The American Telephone Journal knows we are O. K. Write for samples; also figures on large quantities. GILDART BROS., Albion, Mich. 112

POSITION wanted with reliable telephone company as manager or superintendent. Ten years' practical experience in telephone work. If your plant is not paying dividends, let me hear from you. Can furnish best of references. North or south preferred, but am willing to go to any part company desires. Address, Box 108, The American Telephone Journal, 116 Nassau St., New York City. 108.

POSITION.—A first-class construction man with thirteen (13) years' experience in telephone (both Independent and Bell) and electric light work, desires connection with a telephone company in its construction department. Will be at liberty Nov. 30. Address, Box 99, The American Telephone Journal, 116 Nassau St., New York City. 99.

WANTED—All or any part of $50,000.00. WRITE TO-DAY for particulars. The BIGGEST PAYING TELEPHONE PROPOSITION of the day. OPEN for a LIMITED length of TIME only. Address, Box 107, The American Telephone Journal, 116 Nassau St., New York City. 107

GENERAL MANAGER.—Gentleman of executive ability, for number of years general manager of (Bell) Telephone Co., fifty exchanges, 25,000 subscribers and several thousand miles toll lines, will be open for engagement with an enterprising Independent company in December. Familiar with all details of construction, maintenance, operating and successful dealing with the public. Best of references as to ability. Address, Box 109, The American Telephone Journal, 116 Nassau St., New York

WANTED—Young telephone men who would like to make extra money by easy, pleasant work during spare moments. Write now for full particulars. Address, Box 111, The American Telephone Journal, 116 Nassau St., New York City. 111

TO BUY for cash, telephone exchange of 250 to 500 subscribers in Middle or Western state. Address, Box 104, care of The American Telephone Journal, 116 Nassau St., New York City. 104

MANAGER—A good, live, energetic, capable man of experience wanted to manage a large Independent telephone system in the West. Must be able to invest not less than $10,000 in the company. Address Box 102, The American Telephone Journal, No. 116 Nassau street, New York City. 102

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau St., New York City. 73.

The American Telephone Journal

New York City, 116 Nassau Street. Monadnock Building, Chicago.

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VOLUME VIII SATURDAY, DECEMBER 5, 1903 NUMBER 23

SYSTEM IN THE UNITED STATES TREASURY

ANSWERING TEN THOUSAND LETTERS A DAY

By Harold Bolce.

ONE evening a few years ago the Secretary of the U. S. Treasury Department at Washington had occasion to call up New York on a matter of grave and urgent importance, but the one telephone in his office was out of order. He could not make use of telephones in the offices of his three Assistant Secretaries for the simple reason that they had none. Nor was any one of the numerous bureaus in the Treasury equipped with a telephone. In fact, the only instrument in the entire department, aside from the disabled one in the Secretary's office, was down in the headquarters of the Captain of the Watch.

To this far away room, a distance equivalent to nearly a block and a half from his office, the Secretary hurried. A financial movement depended upon his message, and as every second was important, the unique spectacle was presented of a dignified member of the President's Cabinet running at full speed along the corridors and down the stairways of the big Treasury building. He reached the telephone, discussed quickly a pressing financial question with a Federal official in New York City, and gave the authorization for an act which averted a panic. Then, exhausted, the Secretary fell back in a chair. To-day there are nearly one hundred telephones in the Treasury Department, with messages going and coming at the rate of two a minute, with the Secretary, his assistants and the heads of bureaus, transacting telephonically volumes of public business without stirring from their desks, counseling constantly with one another and hourly calling up representatives of the Treasury and other branches of the government in distant cities.

The Treasury is the largest Department in the Government. In fact, including all the branches, it is now regarded as the biggest institution in the world. In spite of its great size and constant growth, which would naturally suggest unwieldiness, the realization is being forced upon the business world that the Treasury in many particulars is somewhat in advance of many phases of contemporaneous commercial life. This enviable progressiveness of the Treasury is maintained in a large measure by a constant and extensive employment of telephones. Ten thou-

Hon. Robert Burns Armstrong, Assistant Secretary of the Treasury.

Hon. Chas. Hallam Keep, Assistant Secretary of the Treasury.

sand letters are received daily by the Treasury at Washington. As a result of recent regulation, promulgated by Assistant Secretary Armstrong, every one of these communications must be answered before the close of the day of its arrival. To assemble the vast amount of detailed information on current Treasury issues embodied in these 10,000 replies, the telephone is used without cessation. Every port of entry and every city of any size east of the Mississippi River, and some west of it, are in daily communication by telephone with the Treasury Department. The Treasury's development to a first place in activity among modern institutions is an outgrowth of a very recent awakening, and it has been the jingle of telephone bells that has roused the big Department from a century of routine.

Within the past few years the Treasury has enjoyed the services of a number of officials of peculiar resourcefulness. They found the Department swamped under an increasing avalanche of business. To enable it to handle systematically and with expedition this great daily inrush of affairs has been their task. They have succeeded to a remarkable degree and it is noteworthy that the distinguishing feature of this work has been the developing of the telephone equipment in the Department. Under the administration of this coterie of progressive officials, according to the estimate of a government electrician at Washington, enough miles of telephone wire have been strung in the Treasury building to reach from Washington to New York and back again to the National Capital. When Lyman J. Gage came to the Secretaryship of the Treasury he found in addition to the telephone in his office four or five instruments stationed in booths in various parts of the corridors. There was no private branch exchange, and no intercommunicating system for the many officials under the Secretary. If they wanted to telephone to any Treasury bureau they had to proceed down the corridor to the nearest booth, and get connection through central. It was easier and usually more expeditious to go direct to the office whose chief they desired to consult.

It was not very long after Secretary Gage's installation that Frank A. Vanderlip, now vice-president of the National City Bank of New York, became Assistant Secretary. Associating with him Milton E. Ailes, a resourceful and progressive young man who later became Assistant Secretary and is now vice-president of the Riggs National Bank of Washington, Mr. Vanderlip reorganized the Treasury. Among other things, he had a branch exchange put in and telephones placed in fifty of the offices of the Treasury. When Secretary Shaw came into office he found a fairly organized telephone service in operation, but it was yet inadequate to the increasing demands. That alert Cabinet officer determined to give to the Department the most efficient telephone service possible.

One reason why the Treasury has forged so far ahead is that it has had the services of a number of men with new and original ideas. One of the best executive officials in government service is Wallace H. Hills, Chief Clerk of the Treasury. Under his direction comes the mechanical equipment of the telephone service in the Treasury Department at Washington and its branches throughout the country. The Chief Clerk of the Treasury is an official of far greater importance than his title might indicate. He could be called the business manager of the Department. He is to the Treasury what the general traffic manager is to a great transcontinental railway system. The equipment and maintenance of nearly 400 Federal buildings in the United States devolve upon him. In most of these structures private branch exchanges connect with the offices of the various representatives of the government in all the cities of the country.

Wallace H. Hills, Chief Clerk, United States Treasury.

An instance of the alertness of the Treasury's use of the telephone was presented in a graphic manner during the prolonged coal famine of last winter. Upon Chief Clerk Hills, who secures the supplies not alone for the Treasury building, the Bureau of Engraving and Printing and other Treasury institutions, but who likewise, as stated, looks after all the Federal buildings in the country, the problem of obtaining coal to keep government furnaces going was one of grave difficulty. Some branches of the Government, unable to secure fuel, had closed their doors. The same contingency menaced the Treasury. The prospect of that Department closing was peculiarly serious. The financial world has daily dealings with the Treasury, and upon those dealings depends in large measure the orderly procedure of fiscal affairs in general. The Bureau of Engraving and Printing, moreover, was working day and night turning out bank notes. A delay in the delivery of these might produce a grave financial disturbance. A shut-down of this great Federal factory might mean much trouble.

Chief Clerk Hills, realizing all these things, was busy at the telephone, engaged in a strategic inter-state movement to procure coal. To master conditions the Treasury's far-reaching telephone service was brought into requisition. Here and there in various portions of West Virginia and Pennsylvania along the line of leading railways, the Treasury Department by the employment of telephones was enabled to locate isolated carloads of coal. To assemble these and bring them to Washington was a perilous undertaking. The task was delegated to Fred B. Rhodes, a quick witted and resourceful young man, who as Mr. Hills' private secretary, has taken on the spirit of the office, which is, in fact, a national supply station. All his arrangements Mr. Rhodes made by telephone. Presidents and managers of several railroads on whose tracks the strike had stalled their cars, declared when they were asked to coöperate with the government in making the attempt to run the labor blockade, that the project was too chimerical to be thought of. However, they wished to place no obstacle in the way of the government's attempt.

So Mr. Rhodes set out for the coal fields. On the evening of January 14, 1903, the coal supply in the Treasury's fuel bins was getting dangerously low, and by the most economic management, seventy-five tons were needed daily to carry on the Department.

At 4 o'clock on the morning of the 15th, his plans carefully mapped out, Mr. Rhodes had taken a train out of Washington. Every available telephone for hundreds of miles was committed to the service of the government in this quest for coal. Cars of coal were located by telephone and by telephone, men were engaged to handle them. Over dead lines established by the strikers, across which no stranger would have dared to venture, the Treasury's messages were carried by telephone. Mr. Rhodes worked day and night, carrying out with masterful precision the plans of his chief. At 5 o'clock on the evening of the 17th, the long distance telephone rang in the office of the Chief Clerk.

"Is that you, Mr. Hills?" said the voice.

"Yes."

"This is Rhodes. I have the honor to report that I am proceeding to Washington with 32 carloads of coal consigned to the Treasury."

No more gratifying message was ever received by a Treasury official. Mr. Hills had made no mistake in selecting a lieutenant to carry out the project. On January 20th, before the last of the old supply had been completely exhausted, special teamsters were hauling 400 tons of coal a day to the Treasury yards from the timely consignment.

By alertness and profound financial judgment Secretary Shaw has twice averted national disaster. His private secretary, John Hinkson Edwards, a young Ohioan of much promise, is one of the most persistent users of the telephone in Washington. By daily and sometimes hourly talks with the Sub-Treasury at New York and with other centers in close touch with monetary conditions, Mr. Edwards is enabled to keep the Secretary posted up to the minute in regard to all public questions of the day which affect the Treasury.

Under Assistant Secretary Charles Hallam Keep comes the office of the Director of the Mint, the Bureau of Engraving and Printing, the Secret Service Division, the Division of Public Moneys, the Divisions of Loans and Currency, the Division of Bookkeeping and Warrants, and the Division of Stationery, Printing and Blanks. But for the use of the telephone it would now be utterly impossible for one man, however energetic, to direct these important branches, each of them being a big institution in itself.

Among the bureaus presided over by Assistant Secretary Horace A. Taylor are the Office of the Supervising Architect, the Office of the Chief Clerk, the Miscellaneous Division, the Division of Mails and Files and the Office of Internal Revenue. It can be readily seen that in the transaction of business which takes in the supervision of the architectural work of all of Uncle Sam's public buildings, the collection of internal revenue, and the infinite details of correspondence passing through the Division of Mails and Files, the telephone, particularly the long distance service, whereby outside towns are reached, is indispensable.

John Hinkson Edwards, Private Secretary to Hon. L. M. Shaw.

To-day every one of the ten thousand letters received daily, every one of the hundreds and sometimes thousands of telegrams, and all of the countless thousands of documents passing from desk to desk, bear the imprints of electric time stamps recording minute by minute the progress of every paper through the department. As stated, every day's correspondence must be attended to upon the date of arrival. Manifestly it is inexpedient upon the part of any Treasury clerk or official to permit matter to accumulate on his desk. The tell-tale stamp reveals to a minute the moment it passed into his hands. Therefore, things are kept moving, and to make this possible, the telephone is used persistently. No sooner does an official matter reach a central desk in any bureau than the first step toward its solution is arranged by telephone.

Under Secretary Shaw's regime the Treasury has leaped ahead twenty-four hours in the transaction of public affairs. In other words, instead of being a day behind, it is now up to the minute. When he took hold, some of the branches were many days behind current business, but even the most progressive bureaus have been quickened by his methods. The secret of his success is the wider use of the telephone in connection with many reforms carried out under his direction by Assistant Secretary Robert Burns Armstrong, the youngest man to hold this office in the history of the Republic. Mr. Armstrong is 29 years old.

Mr. Armstrong, now promoted to Assistant Secretary, has charge of the Marine Hospital Service, the Life Saving Service, the Division of Special Agents, the Revenue Cutter Service, and, above all, the Customs of the United States. Through his industry and modern ideas new trunk lines for telephone service have been put in and the Treasury has become, like the White House, a central office. Private telephone wires run to all the branches of the government from the Treasury. Mr. Armstrong came to the Treasury with a record for devotion to the telephone. On the Chicago and Northwestern Railway one day, when the train stopped at a station, he had difficulty in reaching a telephone. On his return to Chicago he called upon the officials of the road and suggested that they install a telephone service on trains, so that passengers could ring up any city when the train was at a station, or even when it was in motion. The railroad company took up the suggestion and became a pioneer in this important phase of modern telephony. One, on investigating present United States Treasury methods, especially if he was familiar with the old regime cannot help but make a mental comparison of things as they used to be and as they are now. The ever present telephone has probably been a greater factor in the change than any one other. A few minutes spent in the department will soon convince the skeptical. The officials so frequently resort to the useful little instrument that it is easy to see that without it, it would be impossible to answer ten thousand letters a day.

TELEPHONE EXCHANGE ENGINEERING

ARTICLE IX—MACHINE MADE CABLE

By Ray H. Manson, Albion D. T. Libby and Charles A. Simpson.

CONSTRUCTION of machine made cable is best shown by a standard, 21-pair cable as an example, it being understood that other sizes employ similar operations in their manufacture. The cable machines illustrated in the accompanying figures are not necessarily the latest type used, and are only intended to show the operations employed in producing the finished product. In this example let the general specifications for the cable be as follows:

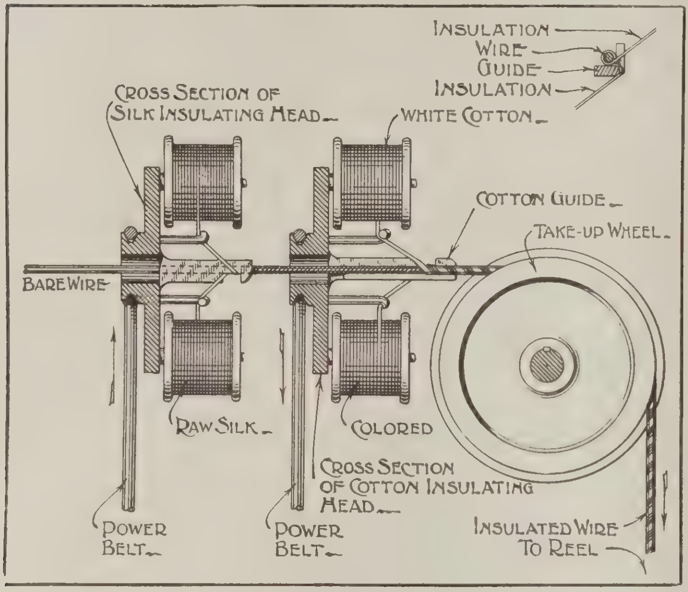


Fig. 36. Diagramatic Drawing of Insulating Machine.

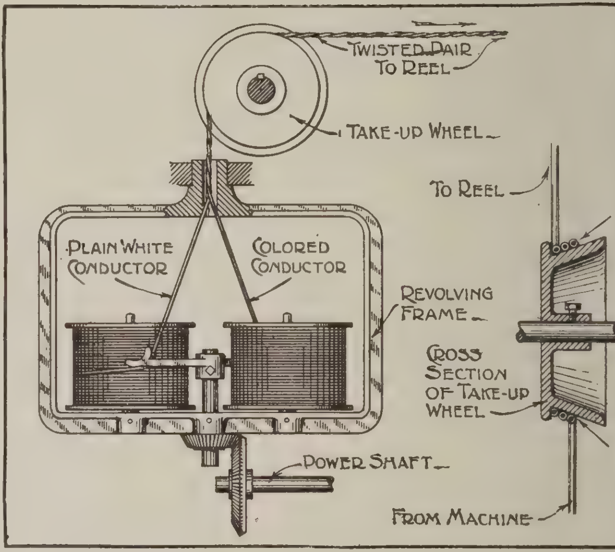


Fig. 37. Machine for Forming Twisted Pair.

Specification for a 21-pair Machine Made Cable.—This cable is to consist of 21 twisted pairs (one twist, each 2 inches) of single silk and single cotton covered, tinned copper wires, formed spirally (one twist, each 8 inches) into a cable and covered with two reverse wrappings of dry paper, the whole being covered with a braiding of cotton and saturated with hot beeswax. The cross-section of the finished cable to be round and not larger than 12-32 inches in diameter. The weight of a finished piece of this cable one foot in length to be about 1-5/16 ounces. The color scheme for distinguishing the conductors to be as follows: The numbers indicating the order of the colors, each colored conductor being twisted with a white mate to form a twisted pair.

No. 1, Blue; No. 2, Orange; No. 3, Green; No. 4, Black; No. 5, Slate; No. 6, Blue and white; No. 7, Blue and orange; No. 8, Blue and green; No. 9, Blue and black; No. 10, Blue and slate; No. 11, Orange and white; No. 12, Orange and green; No. 13, Orange and black; No. 14, Orange and slate; No. 15, Green and white; No. 16, Green and black; No. 17, Green and slate; No. 18, Black and white; No. 19, Black and slate; No. 20, Slate and white; No. 21, Blue, orange and white (spare pair). The twenty-first pair is only intended for use in case one of the regular 20 pairs becomes defective after the cable is installed.

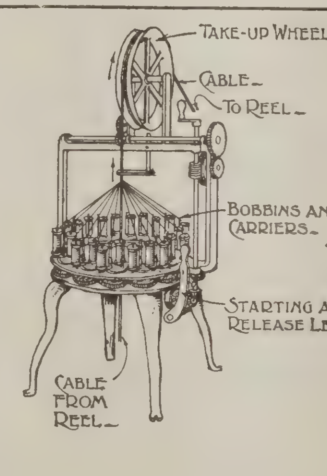


Fig. 39. Braiding Machine.

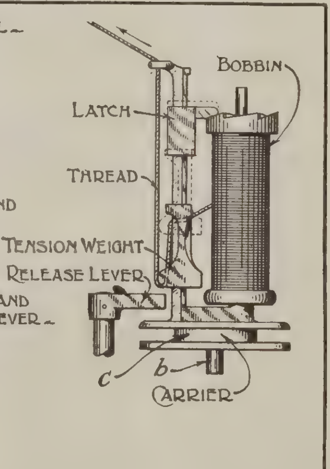


Fig. 40. Bobbin of Braiding Machine

Wire Insulating.—Copper wire, tinned for cable purposes, comes from the manufacturers. The first operation in making the cable will then be to insulate this wire, and as the above specifications call for a single silk and single cotton covering, an insulating machine with double winding heads will be used. Fig. 36 shows how this operation is accomplished, the take-up wheel being geared in combination with the insulating heads so that the wire will be drawn along fast enough to prevent the strands of insulating material from piling up and not fast enough to prevent these strands from covering the wire properly. Six strands of what is known as raw or unbleached silk is wound over the bare wire first and over this six strands of cotton in a reversed direction. A certain amount of this cotton is colored to conform to the color code given in the above specifications with a special dye which will not impair the insulation of the covered wire. The first five pairs in the cable, Nos. 1 to 5 inclusive, have plain or solid colors as a distinguishing code which require all of the six strands of cotton of the same color, but for the remaining pairs, Nos. 6 to 21 inclusive, which have two colors in the covering of one of the wires of each pair, three of these cotton threads will need be of one color and the remaining three of another color as required. The take-up wheel, see cross-section, Fig. 37, is used to impart uniform motion to the wire regardless of the amount of the same piled up in the reel. The wire from the insulating machine is drawn tight by the revolving of this wheel, forcing the several turns wound around its circumference against each other and its flange thus securing a grip which will remain operative as long as the reel takes care of the finished product. Twenty-one (21) reels of wire with plain white insulation are provided for the tip conductors and twenty-one (21) reels with colored insulation to correspond to the color code are provided for the sleeve conductors which are twisted with the tip conductors.

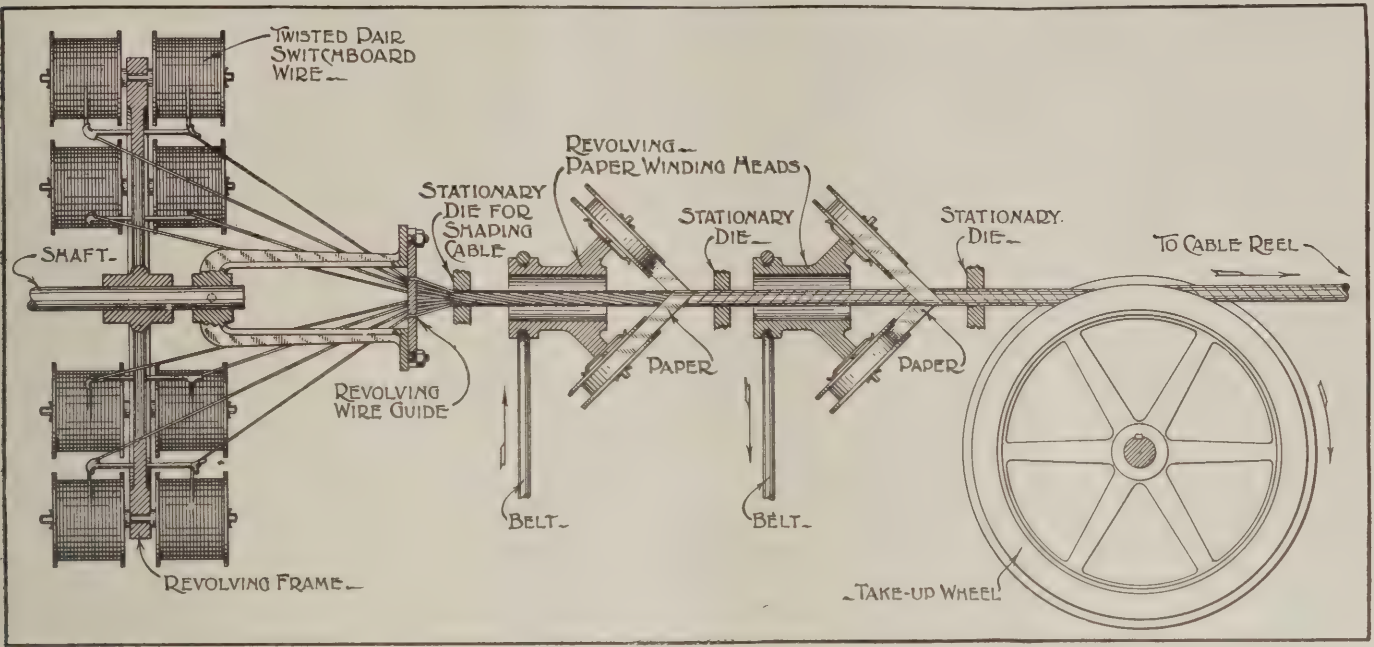
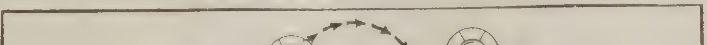


Fig. 38. Cable Forming Machine Making Cable from Twisted Pair.

Pair Forming.—The next operation is the forming of twisted pairs from a white covered conductor and a colored conductor. Fig. 37 shows how this is done, the take-up wheel performing the same function as in the insulating of the wire; it being geared in this case, however, so as to draw the wire along fast enough to allow a complete twist for each two inches of the pair.

Cable Forming.—The reels of twisted pair wire are now placed in a revolving frame of the cable machine with the colors arranged in the order of the code. Fig. 38 shows several of these reels in position, the twisted pairs from the same first passing through holes in a guide, forming a part of the revolving frame, in the order of the color code, and then through the stationary shaping die. The revolving of the reels of wire and guide lays the twisted pairs spirally in the cable, the take-up wheel being geared so as to give a complete twist of the cable in eight inches of length. Two revolving taking heads are shown winding reversed layers of manila paper covering over the bunched wires, thus completing the cable ready for the outer binding.

Fig. 42. Drawing Showing Principle of Braiding Machine.



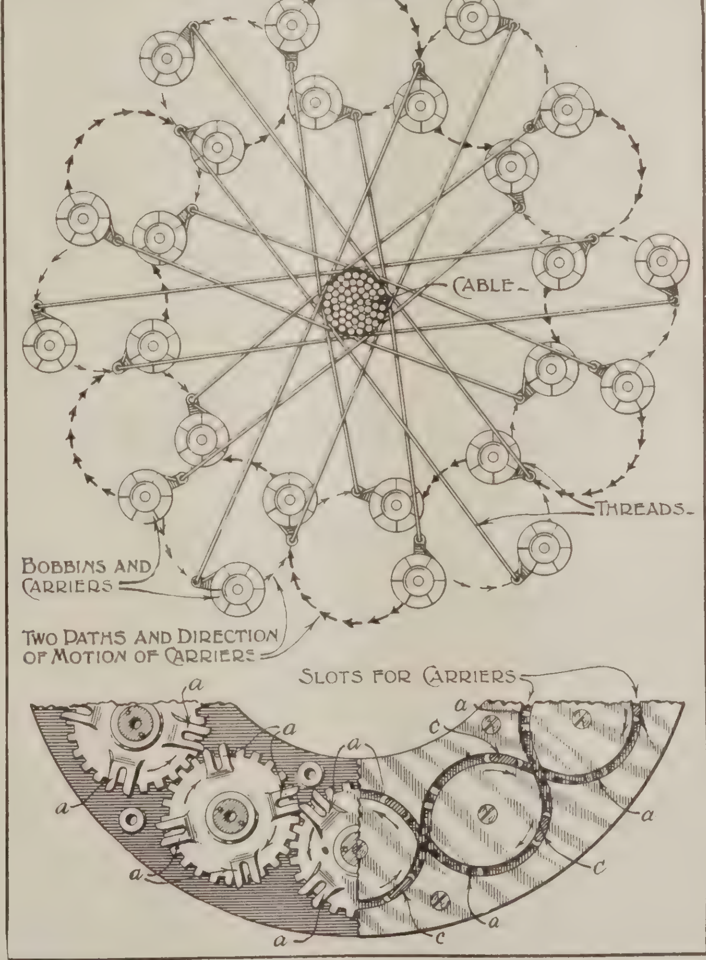


Fig. 41. Details of Bobbin Guiding Arrangement.

Braiding.—Fig. 39 shows a general view of a braiding machine, while Figs. 40, 41 and 42 show details of construction and operation of the same. The unfinished cable is led from the reel through the braider, then several times around the take-up wheel and to an empty reel. The diagram Fig. 42 shows a plan or top view of the braiding operations. The cable is shown in section in the inside, while the radiating lines represent threads from 24 bobbins, 12 of which move in the path of the heavy arrows, while the remaining 12 move in the opposite direction represented by light arrows. Upon examining the paths of these bobbins it will be seen that the threads cross each other and form a sort of weave, which is drawn up tight to the surface of the cable, the motion of the take-up wheel being fast enough to prevent the threads piling up on each other. The carriers upon which the bobbins of thread ride are provided with first a latch to prevent the bobbins from unwinding faster than necessary, and secondly, with a tension weight to keep the thread tight. When the loose thread controlled by this weight is used up the latter reaches its uppermost position (shown in dotted lines), which in turn lifts the latch and allows the bobbin to revolve one of the notches made in its upper head. The bobbin thus remains locked and only releases the thread as fast as needed. If a thread should break the tension weight controlling it would fall below its operating position and come in the way of a release lever, the operation of the latter stopping the braider. Fig. 41 shows the meshed gears which impart motion through grooves *a*, *a*, etc., to the carrier pin *b*, Fig. 40. Each carrier has an elongated guide *c*, which prevents the same from making a complete revolution in a circular path and causing it to move in the slots after the course of the arrows.

Finishing.—After the cable receives its braided covering it is baked for several hours in an oven to dry out all trace of moisture and immediately drawn slowly through a vat of boiling beeswax; the wax only passing through to the paper and leaves the core of wires dry. It is then run through a polishing machine which rubs down all slight inequalities in the braiding and completes the mechanical operation necessary for the making of a switchboard cable. The usual tests for continuity of circuits, crosses, insulation and static capacity are gone through before the cable is considered ready for use.

Factory Cabling.—All long runs in the exchange are done with machine made cable. The methods of laying out this cable to fit the runs varies with different manufacturers. In a majority of cases a complete layout of the cable runs, including all deviations is drawn to scale and from this a cable running sheet is prepared showing the total length of each cable, the distance between butts, length of skinners, kind of form to be used, etc. If these running sheets are carefully prepared from the finished plans of the exchange equipment, it remains a comparatively simple job to cut the cable to length and mark the position of the butts. All the remaining operations of forming and part of the soldering to portable strips of apparatus can then be done in the factory. This of course requires the best engineering system possible and all work requires careful checking in order that the cables may fit without any slack or stretching. The method of finishing cable most commonly used is a slight deviation from the above in that only one end is formed and soldered to portable strips of apparatus in the factory, the other end being left long enough, with a reasonable factor of safety to conform to the running sheet. In this method after the cables are sewed smoothly into the runways beginning with the finished end, the unfinished end is put through the same operation as in the first case. The second method is preferable to the first as no chances are taken as to the proper fitting of the cables, but is more expensive, as half of the work of cabling is done by installers, much inconvenienced by working in close proximity to frames and apparatus. There is also a slight waste in cable which has been left as a safety factor. A third method is sometimes used in which the cable is worked up directly by the installers. This is a sort of cut and try method in which the cable is pulled through the runs and marked, after which the usual shop methods of finishing are gone through by the installers. Modern shop methods make it cheaper and quicker to do as many of these operations in the factory as possible, leaving only the part of setting up the apparatus to the installing crew.

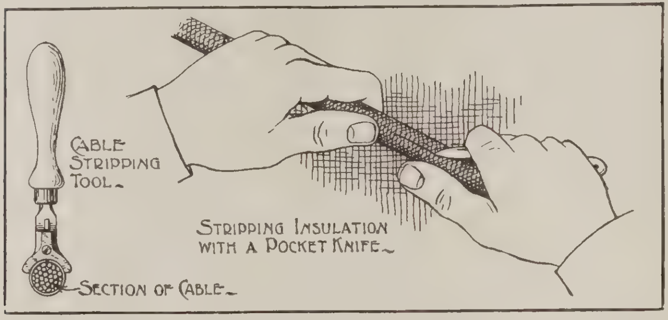
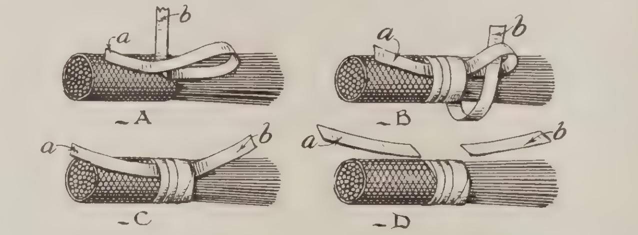

Cable Stripping Tool
Stripping Insulation with a Pocket Knife
Section of Cable

Fig. 43. Special Cable Stripping Tool and Preparing to Strip Cable.

Fig. 45. Butting a Cable.



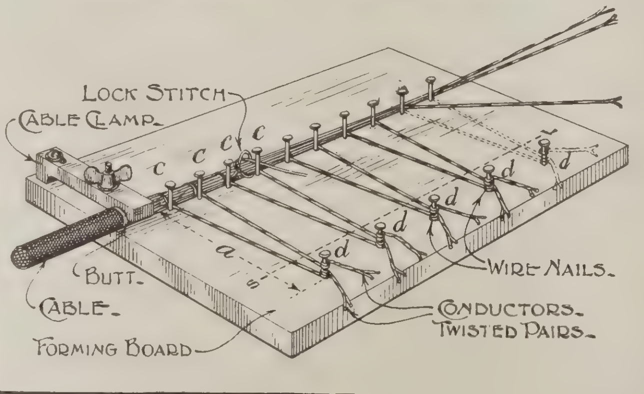


Fig. 46. Temporary Forming Board.

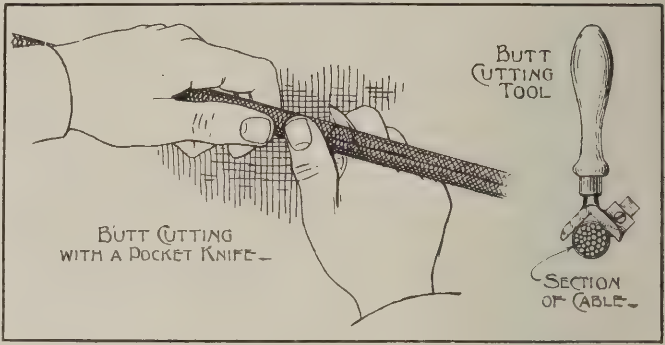
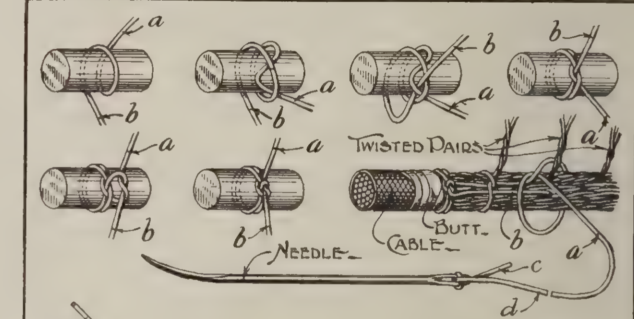


Fig. 44. Butt Cutting by Hand and Special Butt Cutting Tool.

Fig. 47. Packer's Needle and Cable Knot.



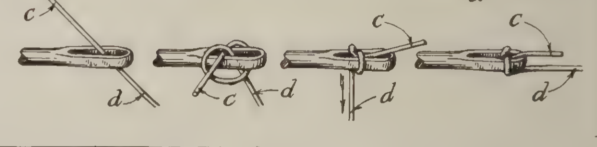


Fig. 48. Threading the Needle.

Stripping.—Considering the cables cut to length and the points for the butts marked the first operation will be to remove the outer covering of the cable with a sharp knife, being careful not to cut through the paper and injure the wires. The best way to do this operation is to hold the knife on a slant and draw its point from the butt mark to the end of the cable (see Fig. 43), afterwards cutting around the cable at the butt so as to leave a clean edge to the braiding, Fig. 44. Figs. 43 and 44 also show special tools for doing these operations. The paper can now be easily removed and cut away at the butt exposing the twisted pairs of wires which can now be fanned out on the form.

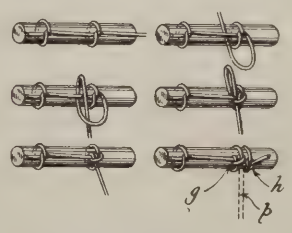


Fig. 49. Cable Knots.

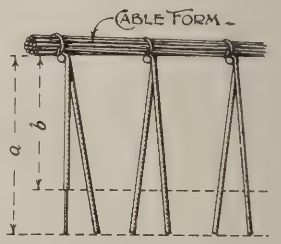


Fig. 50. Skinning Dimensions.

Butting.—A piece of cotton or linen tape about ¼ in. wide and varying in length to suit the diameter of cable is next wound around the exposed edge of the covering, as shown in Fig. 45. In this illustration *A* shows the first operation of forming a loop; *B* the winding of long end *b* of the tape around the cable four or more complete turns and threading the same through the loop first formed; *C* the drawing of the end *b* under the turns, by pulling the end *a* and closing the loop; *D* the cutting of the loose ends *a* and *b* close up to the turns. The completed butt is sometimes shellaced to prevent its turns from becoming disarranged.

Waxing.—The wires now exposed at the ends of the cable could not receive much handling without loosening up the insulation of each so the ends up to and including the butts are boiled in beeswax. Immediately upon removing the cable ends from the vat they are lightly whipped against a hard surface to remove the surplus wax. The beeswax serves the second purpose of a moisture repellant and makes the complete length of cable moisture proof.

Forming.—The next operation, that of fanning out the loose wires over a given form to suit the spacing of some type of apparatus, is usually done over specially made frames, but for explanative purposes the temporary type of forming board shown in Fig. 46 will convey the idea of the more elaborate apparatus. When the cable is provided with a color code each pair is selected in turn according to number and drawn into place around each successive nail *C* and fastened to *d*. The spare wire or pair is left projecting at the end of the cable, and, as before stated, it is only used in case one of the regular pairs becomes defective. The formed part of the cable is now ready to be sewed up with a stout waxed linen twine known as 6-ply Boston lock stitch, a four-inch packers' needle (see Fig. 47) is used to pass the twine under the cable. Fig. 48 shows a secure way to thread this needle and prevent the end from pulling out of its eye. In Fig. 47 is shown the operation in tying the first knot before sewing up the cable; the end *a* being the needle end of the cord and *b* the short end. The rest of the formed cable is sewed with what is called a lock stitch shown in the last drawing, Fig. 47. A stitch is taken at each nail *C* by passing the needle under the cable from the front and drawing the thread through the loop as shown in Fig. 46, care being taken not to incline the nail in the loop or switch. If this is done properly, as shown in the drawings, the loop will hold without loosening after the strain is removed from the needle end of the cord. The last lock stitch is taken at the last pair of wires in the usual way, but is reinforced by a knot *g*, Fig. 49, and a second stich and knot *h* taken around the spare wires on the other side of the last pair p.

Skinning.—Before removing the cable from the forming board the ends are cut to the required length and a certain amount of the insulation on the end of each wire removed ready for soldering. Figs. 46 and 50 show the distances *a* marked off for cutting the wires and skinner length *b* for removing the insulation. The latter operation should be done with a sharp knife by drawing it from the skinner line towards the end of the wire, Fig. 51, at the same time pulling on this end of the insulation which will slip off as soon as the insulating threads are severed. Great care must be taken not to nick the wire itself, as it will easily break at the weakened point upon being moved or handled. Fig. 51 also shows a skinning tool so constructed as to remove the insulation without danger of breaking or nicking the wires. A tool of this nature will save much time and labor.

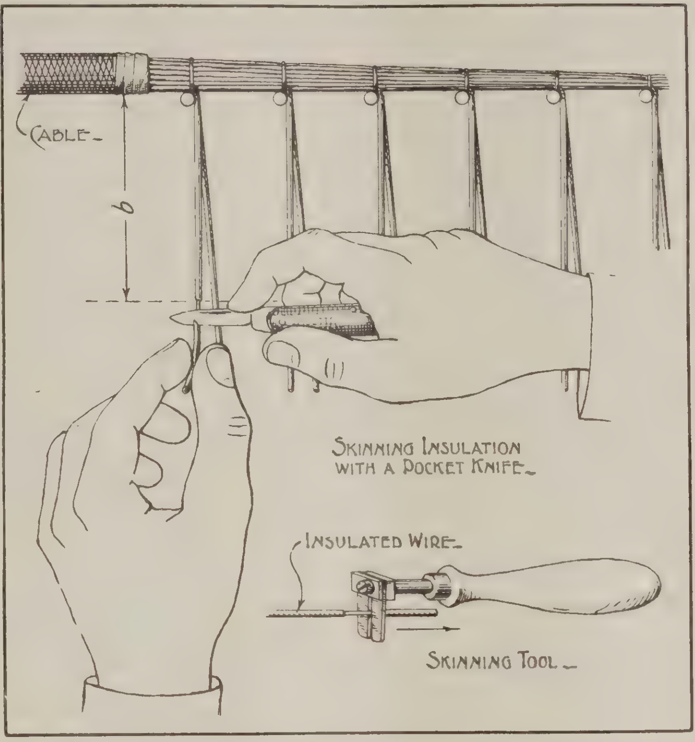


Fig. 51. Skinning a Wire and a Special Skinning Tool.

A HOME MADE OHMMETER

By Arthur Vaughan Abbott.

THERE are many persons to whom electrical measurements are both interesting and profitable, but who for various causes do not desire to invest the necessary amount to purchase expensive testing instruments. The Ohmmeter forms one of the most feasible and at the same time one of the easiest instruments to manipulate, and those who have some mechanical knowledge and a few tools can, with little trouble and expense, construct for themselves a testing instrument which for a great deal of practical work is amply sufficient. A photograph of such a piece of apparatus is shown in Fig. 1, and while the ingenious will at once perceive many advantageous and desirous modifications, the photograph illustrates what can be done in a simple and inexpensive manner, and those who desire can elaborate the instrument to any extent that they wish.

The materials required in the

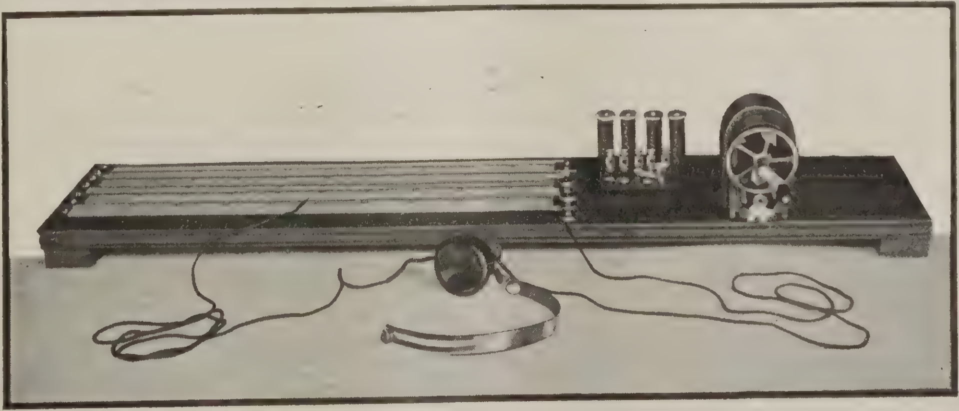


Fig. 1. Photograph of a Home Made Ohmmeter.

construction of an Ohmmeter are few. First, there must be a foundation, which may be a piece of carefully seasoned, thoroughly varnished pine, as shown in the illustration, or if preferred, the instrument may be encased in a suitable box, the bottom of which will serve to support the various pieces of apparatus. A resistance wire shown upon the left hand of the photograph must be provided. This may be procured from any of the well-known instrument makers.

The best form of resistance wire is that known as Maniganin, which can be obtained in almost any of the ordinary sizes, No. 18 wire averaging about an ohm to the foot, although the resistance will vary greatly with the differences in composition. The actual resistances, however, are not of very great importance, so long as the wire is carefully drawn so that it is essentially uniform in resistance from end to end. A piece of this wire about ten feet in length should be procured.

Upon the foundation board a paper scale is made which would be divided into say 500 or a thousand parts. This scale may be either drawn upon a sheet of Bristol board, or what is still more convenient, a piece of cross section paper, as shown in the illustration, may be used, and as is shown is numbered from 0 to 500.

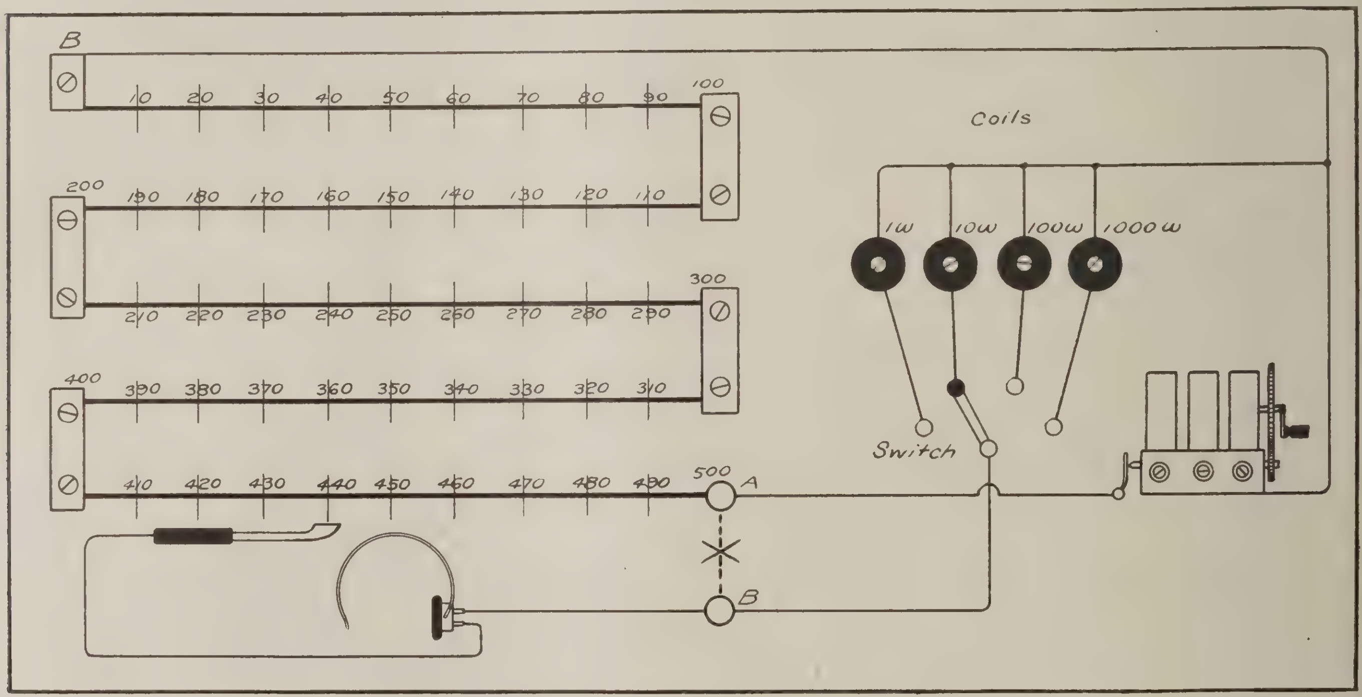


Fig. 2. Diagram of Circuits of the Home Made Ohmmeter.

Five pieces of the resistance wire are stretched over the scale so as to form a continuous piece about 10 feet in length. At each end the wire is secured under some brass plates so that only that portion of the wire which is within the limit of the scale enters into the circuit. At one end of the resistance wire a binding post A is attached, which also forms one post to which the resistance X to be measured is attached.

For standard resistances it is best to procure four coils, one of 1 ohm, one of 10, one of 100, and one of 1,000. These may be purchased from any instrument maker, but is should be specified that the coils are to be wound non-inductively, that is to say that the requisite wire to make up the specified resistance is measured off and then doubled in the center. The wire is then wound on the spool so that any magnetizing effect is avoided. The four point switch must now be provided to which each end of the standard coils are connected, when they have been mounted upon the foundation board. The necessary apparatus is completed by a receiver, preferably of the head gear type, which is supplied with two long flexible cords, one having a knife edge terminal provided with an insulating handle to act as a detector. There must also be a small hand generator as a source of electricity. If preferred, a battery and vibrating coil or a battery and a galvanometer may be substituted for the hand generator and the receiver. An ordinary battery will not do if a receiver is used, as it is best to have an alternating current so that there will be a plainly audible sound in the receiver when there is a state of unbalance in the circuit.

The apparatus is assembled as shown in Fig. 1. Fig. 3 a simplified diagram of the circuit is shown. From inspection of this it is evident that the Ohmmeter is simply a modification of the ordinary slide-wire bridge. The same system of lettering is carried through all of the figures. Fig. 2 is a diagram of the circuits as the apparatus is assembled. The heavy full line A B represents the resistance wire. At the point A a binding post is attached, and from this a connection is extended to the generator and connected to one terminal thereof. From the other terminal of the generator a connection is taken to the resistance wire. Close by the binding post A a second similar binding post B' is mounted. These binding posts serve to connect the object whose resistance is to be measured to the Ohmmeter. To the binding post B' one terminal of the receiver R is connected. Also from this point a wire is extended to the center post and the four point switch, while to each of the other posts one of the ends of the various standard coils are attached, as shown in Fig. 3. The other ends of these coils connect to a lead that extends from the generator to the B end of the resistance wire.

An inspection of this drawing will show the circuit to be as follows: First, there is a circuit from the generator, through the resistance wire, and back to the generator. If the gap X between A and B' is closed by a resistance or other object there is a circuit in parallel with the wire A B formed from A to B', thence to the switch, thence through either one of the standard coils to which the switch lever may be connected and thence to the generator.

To use the Ohmmeter, introduce the object to be measured at X between the binding post A and B'. Place the receiver to the ear, turn the crank of the generator, take the free terminal of the receiver which should be provided with a metallic knife edge with an insulating handle, and pass it to and fro over the resistance wire until a point on the resistance wire is found at which the receiver becomes quiet and the throbbing of the generator cannot be heard. Supposing the scales of the Ohmmeter be constructed as shown in the illustration, and as a concrete example assume that the switch lever is on the hundred ohm coil, and that the receiver terminal stands at 300 upon the resistance scale, the total length of the scale is 500 divisions, the standard coil is 100 ohms, then the following equation holds true: $X = \frac{300}{200} \times 100 = 150$ ohms. In other words, divide the number on the scale opposite which the receiver contact stands by the difference between this number and the full reading of the scale. (In this example the receiver point stopped at 300. The whole length of the scale is 500. 500 — 300 = 200 and multiply the coil used by this quotient.

Compared with the price charged by most apparatus makers the expense of an instrument thus described is trifling. Assume that one purchases all the parts and simply assembles the instrument, the cost will stand something as follows:

Four coils	$3.00
Resistance wire	.75
Foundation board	.75
Switch	.60
Screws and brass	.70
Binding posts	.40
Cross section paper, glue, etc	.25
Generator	2.00
Receiver	1.50
	$9.95

There are many instances, however, where most of this apparatus is at hand. Thus there are few telephone exchanges where the wire chief cannot find a spare receiver and an old generator and enough old ringer coils from which to derive wire for winding the standard coils, and in many cases one would manufacture his own box from board. Under these circumstances the cost would stand about as follows:

Switch	$ .60
Binding posts and screws	.70
Lumber and miscellaneous	.50
Resistance wire	.75
	$2.55

It cannot be expected that an Ohmmeter of this description will have the refinements and the extreme accuracy of the more expensive instruments, yet if carefully made it may be expected to be accurate within 1 per cent., which is usually near enough for all excepting the most refined investigations.

It is desirable to exercise some care in selecting the generator in order to procure a machine which shall be as noiseless as possible, because as the point of balance is found by listening to the receiver any external noise is liable to interfere with the connection of local points. Under these circumstances it is necessary to enclose a generator in a box in order to deaden the noise as much as possible. It would not be a good plan to mount the generator on the same board with the other apparatus as the photograph shows, as it will be so noisy as to interfere with the tests. The generator is photographed mounted on the board merely to show all the apparatus together. In an exchange where there is a power generator a circuit from that can be used.

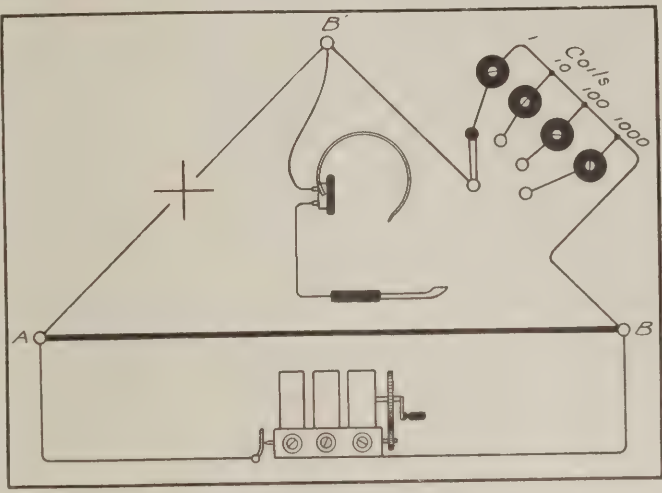


Fig. 3. Simplified Circuit of Home Made Ohmmeter.

If one cares to go to the extra trouble and expense it is exceedingly convenient to wind the resistance wire *A B,* upon a large circular spool and mount it upon a spindle with a contact spring (which takes the place of the knife edge) arranged to press against the wire on the spool instead of the separate contact in the receiver cord. By this means a very long piece of resistance wire can be used and by counting or providing an indicator to measure the number of revolutions which the wire drum makes, very great accuracy can be secured.

IMPORTANT POINTS IN RECEIVER DESIGN

By W. W. Dean.

THE most important point to be remembered in designing a telephone receiver is that the instrument which will respond to very weak currents of very high frequency is the best one. Many designers deceive themselves in testing telephones by making their experiments over a short line, consequently with comparatively large currents. If a telephone receiver were used only for receiving over short lines, say within the limits of any one city, it would be so designed as to speak very much louder than a receiver which must also do duty over long distance lines of from 1,000 to 2,000 miles in length. It must also be remembered that at times long distance lines are in such bad condition that with the best possible instruments one is barely able to hear what is being said at the far station.

It is evident that in a case like this, a commercial conversation depends almost entirely on whether or not the telephone receiver is sufficiently sensitive. A telephone receiver must respond to currents of very high frequency for two reasons: First, the high frequency currents are the most weakened in transmitting over lines and cables which have a great static capacity, and secondly, because if the high sharp tones of the voice are weakened, the consequence is muffled transmission. I have found by experience that a telephone which will receive very weak currents of 1,000

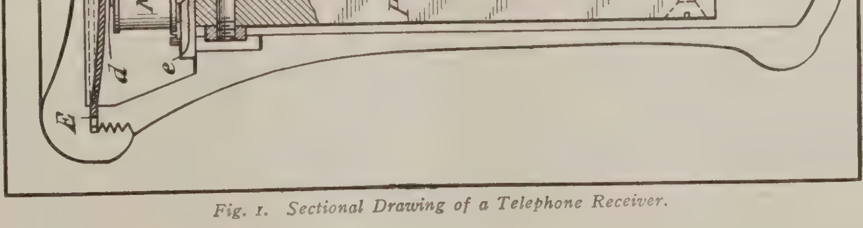


Fig. 1. Sectional Drawing of a Telephone Receiver.

cycles per second will also receive, sufficiently loud, strong currents of a very much lower period. In order to accomplish the results before mentioned, the following parts and dimensions of the receiver must be carefully proportioned. Referring to Fig. 1.

(*1*) The quality and cross section of the soft iron cores *N* of the bobbins *M*.

(*2*) The strength of the permanent magnets *P P*.

(*3*) The diameter and thickness of the diaphragm *D*.

(*4*) The distance between the poles *d, d*, and the diaphragm *D*. In this connection it is important to notice that the actual gap between the lower part of the diaphragm *D* and the pole pieces *d* is less than the distance between the surface *E, E*, and the pole pieces, inasmuch as the diaphragm is deflected downwardly, due to the pull of the permanent magnets *P*. In Fig. 1, the diaphragm *D* is shown deflected downwardly in an exaggerated manner. I find that in the average receiver this deflection from a straight line is about .002 of an inch, depending, of course, upon the thickness and diameter of the diaphragm, the strength of the permanent magnets and the distance between the clamping surface *E* and the pole pieces *d*.

(*5*) The number of convolutions of wire wound around the bobbins *M*. The resistance of the windings of the telephone receiver is of secondary importance because it forms a very small part of the total resistance of the circuit in which it is placed, so that it can suffer wide variations without appreciably affecting the volume of transmission.

(*6*) The working parts of the receiver should be clamped to the rubber shell near the diaphragm end of the instrument, so that expansion and contraction of the magnets *P* will not appreciably affect the working air gap between the diaphragm and the pole pieces *d*. It is also very essential that the magnet and bobbins should be very rigidly clamped to the shell in order that whatever jar the instrument may receive will not cause them to move. Personally, I prefer that a telephone receiver have absolutely no adjustments because I have found that wherever they are furnished, the parts are invariably out of adjustment. Where the tools and jigs used in the manufacture of a telephone receiver are properly designed, it is absolutely unnecessary to have any adjustment because the parts will all drop together accurately, and each instrument will be exactly like every other one.

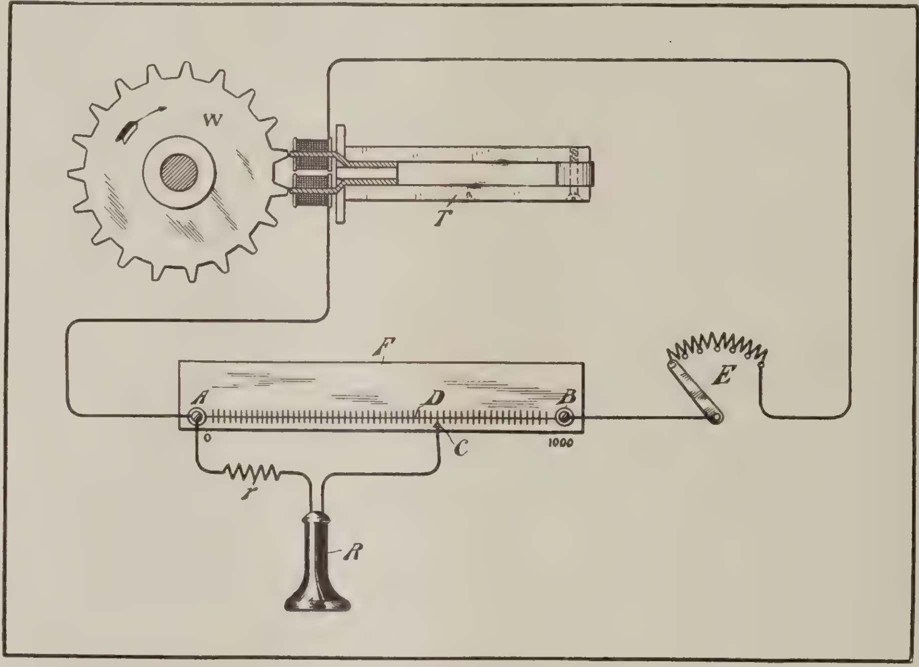
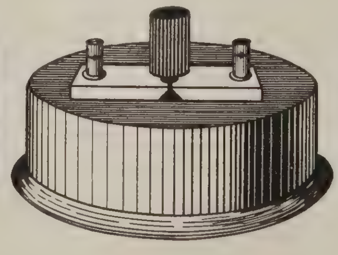


Fig. 2. Circuit of Apparatus for Making Comparative Tests of Telephone Receivers.

In the second article of this series receivers having different dimensions will be illustrated, and their relative values given. In making comparative tests between receivers of different dimensions and makes, I have found the method illustrated in Fig. 2 to be an extremely valuable one. The toothed wheel *W* is made of cast iron and is mounted directly on the shaft of the small direct current fan motor. Rigidly mounted in front of this toothed wheel are the magnets and bobbins of an ordinary bi-polar telephone receiver. It is evident that when the toothed wheel *W* revolves in front of this telephone magnet an alternating current is generated in the bobbins. In other words, this is simply a small alternating current generator. In the machines which I have constantly used for a number of years the wheel *W* has 20 teeth, and I am able to revolve it at the rate of 3,000 revolutions per minute, so that an alternating current of 1,000 cycles per second is generated in the bobbins of the telephone receiver.

When this current is passed through a telephone, a loud pure tone of extremely high pitch is heard. I connect the terminals of this small alternating current generator through an adjustable rheostat *E* to the terminals of a slide wire *A-B*, which is one meter long and is divided into 1,000 parts or millimeters. I adjust the potential difference between the points *A* and *B* to any desired amount by means of the rheostat *E*. In comparing two receivers the method is as follows: I connect one terminal of the receiver through a very high resistance *r* to the point *A* of the slide wire and the other terminal of the receiver to the sliding connection *C*. I now move the point *C* up and down the slide wire until the sound of the alternator is just audible in the receiver and then make a reading on the scale. We will say, for instance, that the reading is 750 millimeters. Next the receiver which is being compared is substituted for receiver *R*, and then by sliding the contact *C*, the point is found at which the alternating current is just audible in the receiver being compared, and a second reading is made which will say, for example, is 650 millimeters.

It is fair to suppose now that the relative values of these two instruments are represented by 750 and 650. With the small generator that I at present have the potential is so small that I have been unable to measure it, but I have in process of construction a Mordey alternator from which I will be able to get alternating currents up to 8,000 cycles per second, and of almost any desired strength. When this machine is finished I will be able to accurately determine the potential between *A* and *B* and then by means of my graduated wire read the fraction of this potential, and thus be able to express the value of any given receiver in absolute units. It is very necessary in making the experiments herein explained for the point of observation to be located in a sound proof booth. Otherwise it is impossible to accurately determine the point at which sound is first audible and to be of value the experiment must be accurately handled.



THE SELECTION AND TRAINING OF TELEPHONE OPERATORS

By Henrietta Brown.

WHEN an Independent exchange is opened for business in a city or town where the Bell company is operating, it is common for quite a number of the operators from the older company to make application for positions with the new company. While many good operators have been secured who are experienced, I have found that the majority are those who are of a nervous and dissatisfied nature, and hard to settle down to new rules. Particularly if there have been strikes among the operators in the old exchange, and very often those who apply, if accepted, are the first to cause unpleasantness. For this reason I prefer to open a new exchange with operators I have trained and picked from the ranks of the inexperienced.

Mrs. Henrietta Brown

When it becomes known that operators are needed, I have always found the supply equal to the demand. I prefer a personal interview with each applicant, to whom I give a printed blank form to fill out, on which she writes name, age and address. There is also space provided on which I jot down items important in making the selection. The forms which are filled out by the prospective operators are filed away for future reference. The filled out forms can be indexed and arranged in some kind of a systematic order similar to a card system so that they may be readily accessible when a new operator is required. By going through the file the characteristics of all applicants may be reviewed and the operator selected that seems best fitted for the position. I prefer that the student live with her parents; that she have a good common school education; that she bring as many references as to character, former employment, etc., as possible. While I depend on personal appearance in the selection more than references, it is also well to know with whom she has been associated.

The applicant is told that she will be sent for if she is selected, and never, in any case, is she entered in the school on the day she files her application. I do this to give myself ample opportunity to select the very best and avoid if possible, putting on a student that does not promise the best results when trained. As to the age of the applicants, those from eighteen to twenty are best. I never engage one who is over twenty-five. The student who has reached the latter age generally proves obdurate and unwilling to conform to the instruction of her teacher or obey the rules. I depend largely upon the neatness and cleanly appearance of the applicant and generally can form an accurate conclusion as to her moral character. If she satisfies my judgment in these particulars, is bright and quick, her application blank secures my O. K., and is filed away. A few other important points to be kept in mind are that each applicant speaks without impediment with distinct articulation, also that her hearing is unimpaired. My way of testing the hearing is by low conversation; if she fails to hear what I have to say and often asks me to repeat a question the test shows that her hearing is not good enough for that of an operator. As to sight I draw the line on thick lenses, though an applicant may wear glasses and develop into a splendid operator. Usually 75 per cent. of the applicants are accepted, the average may vary some in favor of smaller towns and cities. Those who finally become the most reliable are girls of French and Irish descent.

Training School for Operators in New York City.

THE TRAINING SCHOOL.

When the required number of applicants are in, the entire list is gone over carefully and those are sent for who seem best adapted to the work. The student is placed in what we term a listening position for two days, beside an experienced operator. This we do to train the ear to the numerous sounds and clicking common to the switchboard, and wires during the process of the regular work. She is carefully taught the plan of construction of the board, the number of positions, panels, answering jacks in each section, the numbering strips, the series of multiple jacks, names and uses of all apparatus that she will have to use; she is familiarized also withe all terms used in telephony which she may hear.

After the second day she takes the position of the experienced operator and is taught to put up connections during the slack hours with an instructor always at hand to follow each connection and make suggestions. As soon as the busy hours come on again she moves aside for the regular operator to perform the work. After two weeks of this kind of training the student, if attentive, is prepared to take a position on the evening force. I give her a personal examination, however, before assigning her to evening work, and then it is the student is placed on the payroll. The average student requires about three months before she can be trusted to handle a position unassisted or without watching.

EVOLUTION.

The promotion from evening work to that of day duty depends upon the skill of the student. The promotions are made as fast as operators are needed for day work in the order of enrollment. I retain only those that show by their work that they are capable of filling day positions. The first day work is that of relief, replacing regular operators that work on two to two and one-half hour shifts. No operator is required to work longer than two to two and one-half hours without a relief of fifteen minutes; these recesses give the operator ample time for recreation and diversion from the strain of her work and as I have made it a rule to have these recesses to come the same time each day for each operator, it avoids any possible overstrain and they always know when to expect a relief. All operators under me work eight and one-half hours for an actual working day, and I have three sets of operators, commencing at 7 A. M., working to 5 P. M. The beginners work from 5 P. M. to 10 P. M.; this we style evening work, and all-night operators go on at 10 P. M. and work until 7 A. M. These hours are never changed and avoids all confusion. We never change a night operator to day work, nor the reverse. This, however, does not apply to those classed as evening operators. The less change with operators in position and in time, the better. This gives an opportunity for the subscriber to get used to the operator and the operator becomes familiar with the needs of her subscribers.

I start my relief at 8:30 A. M. with as many reliefs as are required to give all operators a recess and get through by 11 o'clock A. M., when the lunch hour begins and continues until 2 P. M., and the relief commences again.

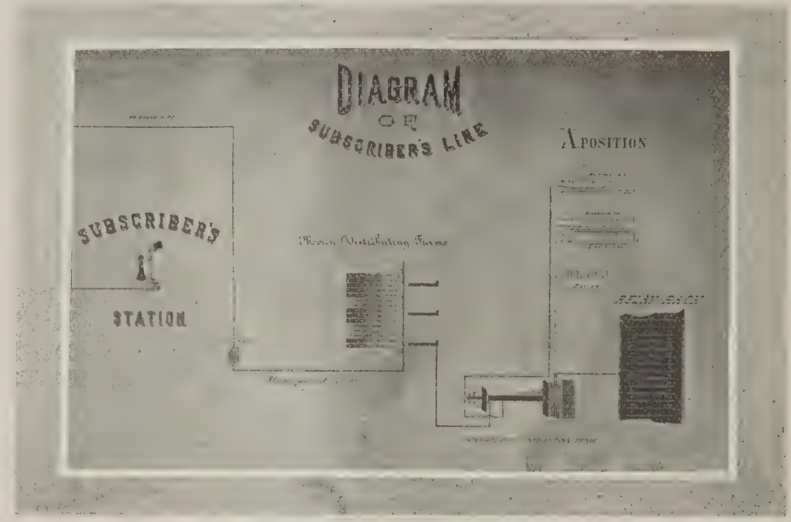


Chart to Show Student Operators Arrangement of Apparatus.

GENERAL OPERATION.

A good operator can make from 250 to 300 connections per hour during the busy hours on a board where there is no trunking. Our busy hours are usually from 9 to 11 A. M. and 2 to 4 P. M., with a falling off during the other hours. Subscribers complaints are made to a supervisor and are handled, with a handy printed blank form which shows subscriber's number, date, and time of complaint, name of party complaining, and the complaint. On the same slip provision is made to show disposition of complaint, also name of the supervisor receiving it.

The operator is cautioned and tests are made from the switchboard with a short circuit plug to see exactly the time it takes the operator to answer and her manner. I usually make ten tests on the line, and if the average tests above three seconds I again take it up more sharply with the operator. I then call the subscriber to see if he is better satisfied, or has had further trouble. I usually call the subscriber the second time and if found satisfied, the complaint ticket is filed away for future reference. If subscriber still complains the ticket is retained, the line is watched until the service is improved, with frequent calls to the subscriber until he O. K.'s the service. "Don't answer" and "busy calls" we report to subscriber "party don't answer" and do nothing further unless the subscriber complains. He is then referred to the chief operator who ascertains whether or not the line is in trouble by ringing again from another position on the board. We do not call for "busys"—the operators are too busy to watch the busy wires; if made a practice of calling "busys" the subscriber holds us responsible in a way for those calls, usually the party whose lines are busy most of the day are railroad offices, express companies and other large concerns who will worry along with one telephone as long as they think they are getting all their calls, when two or three telephones would not accommodate their business. When a complaint is referred to me relative to this matter, I usually advise them to visit the contract department. The chief operator and assistant handle all difficulties between the subscriber and the operators, and all requests for information are turned over to an information operator. We plan to place the exchange in a position to fulfill all reasonable demands that will enhance the value of the service to the subscriber and this department seems to be very desirable. We do not allow our operators to converse with the subscriber. I have a set phrase for most conditions that present themselves to an operator and prefer when a call comes in, the simple answer "number," with the rising inflection of the voice, than to use "number please?" as it takes less time. However, were I able to advise the public, I should say if they were to adopt a more general use of the word "please" to the operators an improvement would be made in the service. I do not tolerate "visiting" between the operators and subscribers. I do not object to their saying "good-morning" or some such phrase in cases where the subscriber shows a tendency to treat the operator with respect and appreciation. Presents from subscriber to operator are allowed. Kindness pays and these little friendly salutes can work no harm.

Recitation in New York Operators' Training School.

I select my supervisors and monitors from the ranks; on their ability both as operators and executive fitness depends their promotion. I do not allow my assistants to "nag" or find fault further than correcting their mistakes, with those over whom they may have supervision. This very often is the means of spoiling the very best operators, as it tires them more than their work. We are giving on several boards over which I have charge an average of from 1,500 to 2,000 tests per month made from subscribers' stations. These average less than 2½ seconds. Our tests are made in many instances from subscribers' stations by our collectors and solicitors, who are supplied with stop watches and printed forms which show the time test is made, telephone number, operator's number, and date. I make a peg count the first working day of each month, which funishes me with an accurate idea of what each operator is doing. It also enables me to arrange my force to equalize the work, and is also valuable to the maintenance department.

EDITOR'S NOTE.—Mrs. Brown is traveling chief operator for the Central Construction Company of Toledo, Ohio. She began the telephone business as an operator with the Chicago Telephone Company in 1890 and served in almost every capacity in her line with that corporation. She has opened and had charge of the operating departments of the Independent exchanges in the following cities: Louisville, Ky.; Toledo, Ohio; New Albany, Ind.; Clarksville, Tenn.; Rome, Herkimer and Utica, N. Y.

PROTECTIVE IMPROVEMENTS

By Clarence Grove.

MUCH experience in the construction of protective devices for telephone lines has resulted in the very general opinion that three forms of protective apparatus are necessary to attain the best results. Each complete protector must include first, an open space cut-out, designed to act as a spark gap and relieve the circuit from high potential discharges by forming a relatively easy path to ground. Second, there must be some form of thermal apparatus so designed that when an abnormal current and relatively low voltage appears the thermal apparatus under the effect of the heat created by the extra current will operate in such a manner as to open the side of the circuit towards the apparatus to be protected and ground on the other side. Lastly, a fusible cut-out of relatively large carrying capacity and extended across a long gap must be provided.

Technically, these three pieces of apparatus are known by the names of the open space cut-out, the heat-coil, and the fuse. For the complete protection of a telephone line it is usually considered desirable to place an open space cut-out and heat-coil on the distributing board to protect the central station apparatus, to place a fuse wire on underground lines where the cable to the central office joins open wire, to place a second fuse open space cut-out and heat-coil at the subscriber's telephone sub-station.

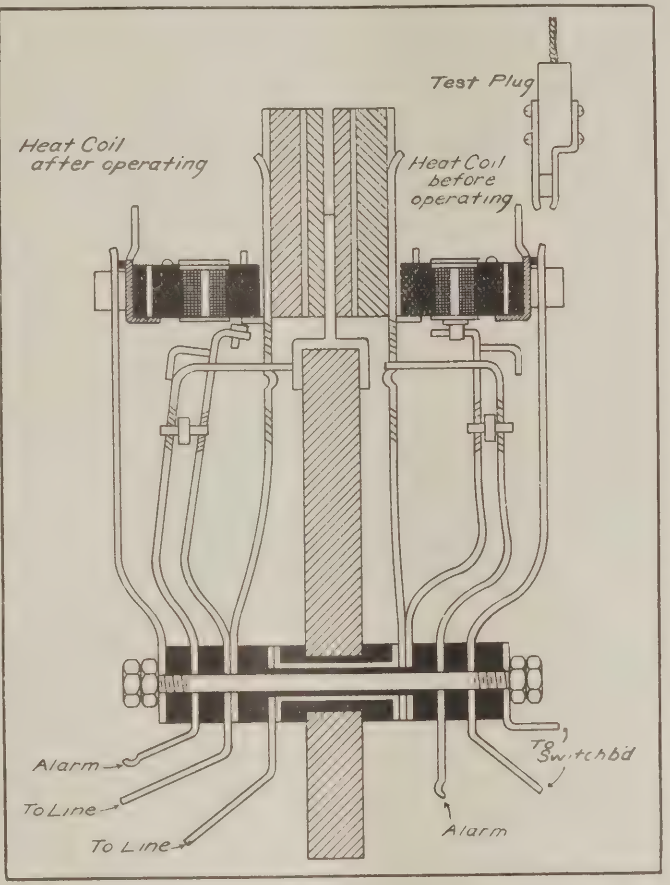


Fig. 1. Sectional Drawing of Improved Central Office Protector.

From time to time these various pieces of apparatus have appeared in one form or another, all of which have been more or less successful. There are, however, some recent changes which it is desirable to chronicle. Fig. 2 is a photograph of a fuse in combination with an open space cut-out. Such a device is particularly convenient as applied to a cable head in order to protect the cable from abnormal currents entering along overhead lines.

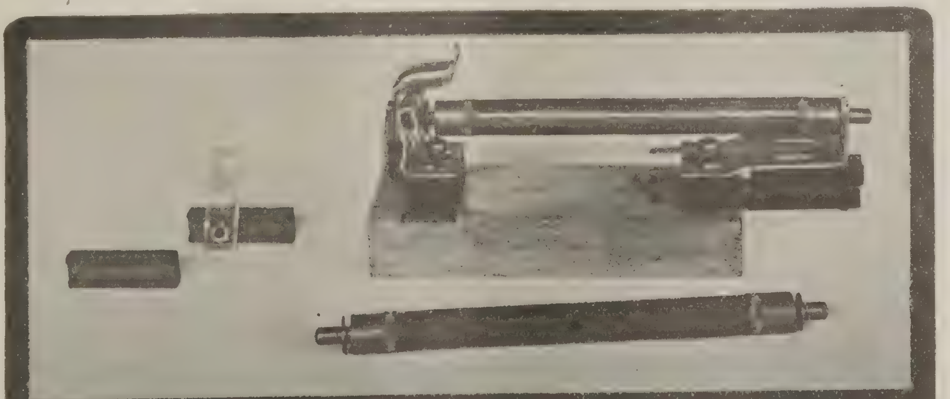


Fig. 2. Photograph of New Type of Protector.

The fuse is a substantial wooden cylinder at each end of which a terminal is attached, so contrived that it may be sprung into place between German silver clips. Through the center of the cylinder a fuse wire of any desired capacity preferable from five to seven amperes, is strung and attached to the terminals. A hole is drilled crosswise in the center of the cylinder, which allows the escape of the hot air and volatized metal when the fuse blows. The clips into which the fuse is inserted are arranged to hold a pair of carbon plates, between which a thin disc of mica or other non-combustible material is placed. This mica is perforated with several holes. By this means an open space air gap is formed which can be most exactly adjusted at will to any desired potential.

It is usually customary to make the mica from 1/200 to 1/100 of an inch in thickness, and under these circumstances the gap usually breaks down at about 300 volts. Formerly it was customary to provide a recess in one of the carbon plates which is filled with a button of easily fusible material, the idea being that a heat coil can discharge without melting this button and permanently ground the line.

Another ingenious way of accomplishing this result is to fill the recess with wax in which a small shot is placed. In this manner the heat melts the wax and the gap breaks down. As formerly constructed, an expert mechanic and a special set of tools were required to repair every heat coil, because it was usually necessary to take the coil pretty completely to pieces in order to reconstruct the terminal.

Fig. 2 shows an improvement in this respect. The heat coil, instead of being provided with a pin which passes through a helix in the center of the coil, is provided with a disc on its exterior to which a pin is attached by a solder with a low fusing point. The heat coil as shown in the illustration is one designed for a distributing board, and the line springs of the protecting frame are held by a pin which is soldered to the disc of the heat coil. As soon as an abnormal current enters, this solder is melted, the spring released and allowed to fall to ground, thus grounding the discharge of the line and opening the switchboard circuit. Simultaneously a bell contact is made and an alarm sounded.

It is very easy to see that the repairs to a heat coil of this description are exceedingly simple. Almost anyone can take the pin out of the spring and re-solder it to the heat coil simply with the heat of a match, which is a cheaper way than the old one.

TELEPHONE INFECTION

By Cyrus Edson, M. D.

THE infection of a human being by means of bacteria which, developing in the system, gives rise to different diseases, may be likened to the sowing of seed by the husbandman or gardener who reaps what he sows. If a man has diphtheria, he must first have been infected with the seed of diphtheria; if he has typhoid fever he must first have been infected with the seed of typhoid fever. These seed we call "bacteria." Now, there are many varieties of bacteria, just as there are many varieties of seed. Most of these are perfectly harmless and doubtless play a part beneficial to man in carrying on his bodily functions and perhaps in destroying the infective bacteria that are harmful to him.

Dr. Cyrus Edson.

Mere contact with the bacteria of disease is not sufficient to cause it to develop in a given person. Certain favorable conditions are necessary to secure this development. The soil must be in a state conducive to the growth of the germ; that is to say, the tissues of the person must be in such a condition that the germ will grow in them. Disease germs are plant life and not animal life, as most people erroneously suppose, hence the simile between them and seed is exact—rather, it is more than a simile, it is a fact.

Not everyone who is actually inoculated with the germs of a disease develops that disease. There is probably not a day in the life of any individual of the human race who lives in a city that he does not receive into his system the germs of some infectious disease. If we all caught disease every time we were exposed to it, the human race would be very quickly destroyed. The great majority of us are for the most time immune against all infectious diseases.

Occasionally, however, one of us becomes "run down;" his system is depressed from some cause; it may be exposure to cold, an attack of indigestion or diarrhoea, or it may be from some other condition, for the influences that depress the human system are too numerous to enumerate here. This depressed state of the system fertilizes the tissues for the development of the infectious disease just as heat and moisture and fertilizer prepare the soil for the growth of plants. After a period of incubation, during which the seed or germ is growing, the disease breaks out and the doctor recognizes by its symptoms, tuberculosis, diphtheria or typhoid fever, or one of the many infectious diseases, just as the farmer recognizes by the characteristics of its leaf, etc., the plant that has burst its way through the soil.

Another condition that is necessary to effect the growth of the seed is its proper implantation. In the case of many diseases it is necessary to inoculate the seed deeply into the system in order that it may properly develop. A mere scattering of the seed over the surface of the body is not sufficient to effect this. Some diseases, like tetanus (lock-jaw), require an abrasion of the skin, and not always is a mere scratch sufficient—the germ must be deeply implanted by a cut of considerable depth. The germs of disease are not dangerous when cultivated in moist media outside of the body. We find that these germs may be grown in bouillon, on the surface of gelatin, on potatoes and in numerous other ways; and there are in New York City many laboratories containing a full line of germs of most of the infectious diseases known to man. The skillful bacteriologists who handle these germs do not get the different diseases because they take a certain amount of precaution and are aware of the fact that the germs cannot escape from a moist surface.

Many of the germs of disease, however, retain their activity in a dried state and are ready to develop and grow as soon as they reach a suitable medium. The sputum of the consumptive and the diphthertic patient contains millions of little germs, each capable of producing the disease in another person. When such sputum dries the germs are virulent for a considerable time.

Examinations have been made of telephone transmitters, and different kinds of bacteria were found. Now the mere presence of bacteria anywhere on the earth proves nothing. Twenty different varieties of bacteria have been found under the finger nails of a man whose hands had been thoroughly washed and scrubbed. There are bacteria everywhere. It is only the bacteria of disease with which we have to do. I believe that if a thousand public telephone transmitters and receivers were examined only one or two would probably be found to be infected with disease germs. This is a slight danger which cannot always be avoided. A percentage of the human race must sicken and die because we find it convenient to live in cities. The railroad, the electric light, the steamship and the gas we burn, all claim a number of victims yearly, and in this way man pays for anything that is of great public good not only with his money, but with his life.

The mouthpiece and the receiver of the telephone should be kept perfectly clean, since cleanliness is a virtue and its opposite a crime. I have seen receivers of telephones which were filthy and dirty that might easily be dangerous sources of infection. No amount of disinfection will take the place of cleanliness. With regard to the proper use of the instrument, I think a few words would be apropos. I have often seen people talking into the transmitter of the telephone, the mouth and lips being practically in contact with the instrument. If such a person were suffering with tuberculosis or diphtheria he would certainly infect the instrument and the next person with the same improper habit of using it would catch the disease if his system were in the right condition to receive and develop it. It is not, as every one knows, necessary to use the instrument in this way; the mouth may be kept at quite a distance from the transmitter, and the voice be transmitted perfectly. But many people go to the opposite extreme and talk too far away from the transmitter mouthpiece.

In conclusion I would state that if the telephone transmitter and receiver are used properly and the same rules of cleanliness applied to them as to other articles of use by a cleanly person, no danger whatever need be apprehended from them. At least, no more danger can come from the telephone than from the signs which swing over our heads as we walk down Broadway and the steam boilers over which we wend our way. We need not trouble ourselves with alarmists, who, if they had their way, would keep us in a continued state of panic, like frightened children, peering around every corner and behind every bush for a bacterial "bogey man," who will stop us from touching car straps, drinking soda water, eating meals in public restaurants, who would send us in terror from the telephone and even embitter our kisses with microbic distractions.

Editor's Note.—This article, which was written especially for The American Telephone Journal and published some time ago, has been republished by request. The late Dr. Edson was Health Commissioner for the State of New York and for New York City, and enjoyed an international reputation as a bacteriologist and medico-scientist generally.

WIRE TOWERS OF EUROPE

By Klas Weman.

WE very seldom find overhead construction in America carried on roof standards, probably because people over here prefer to have the city streets adorned with unsightly poles, and their windows gridironed by networks of telephone wires which are so thick that they obscure the sky rather than to allow a telephone company, even in consideration of the use of a free telephone, put part of its property on their roofs. The attention of the American telehone engineer when he examines European methods is especially attracted by the overhead wires, which in continental cities are almost invariably carried on iron standards, over the roofs of the buildings.

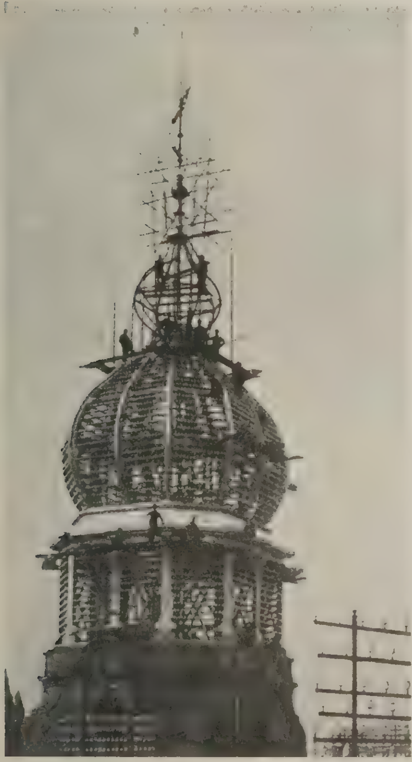


Fig. 1. Wire Tower on Telephone Exchange at Frankfort on Main, Germany.

The larger European cities, of course, have conduits, but the roof construction, in many places, is still almost universally used. The location of the central telephone station need not be inquired about, as the telephone tower to which all telephone wires radiate is generally very conspicuous. The European telephone companies, in the early days, before underground construction was attempted, not being permitted to have pole lines on the streets, found it to be practical, though expensive, to distribute the different telephone circuits in all directions from the steel wire tower of their centrally located exchange. A great many difficulties were experienced with the wire towers as it was almost impossible to equalize the strain caused by the wires on all sides, and besides, the incessant vibration due to the wind and other causes was very injurious. A heavy sleet storm would play sad havoc with a weakly constructed tower, and cause no end of trouble to the operators of the system.

The largest tower in the world of this kind was built in 1885 by the General Telephone Company, of Stockholm, Sweden, which is shown in Fig. 2. It was built entirely of structural steel and rests on its own foundation independently of the office building itself, although the pillars and braces of necessity pass through the building. The height of the tower is about 130 feet over all, and it stands about 75 feet above the roof of the building. This tower has nine floors or landings, and accommodates 10,000 metallic circuits. It was designed by one of the company's engineering staff, and the cost was about $16,000. Within a radius of ten miles the company has about 40,000 subscribers to serve, and the tower is also very useful for distributing the short lines which reach sub-stations in the intermediate neighborhood of the exchange.

The German Government telephone engineers have an especial fondness for building towers of fancy design, and the exchange buildings in the larger cities are, as a rule, adorned with a dome of ornamental proportions constructed of structural steel. Fig. 1 shows the tower of the exchange in Frankfort on Main. Here, the architect evidently has had more to say than the practical engineer. It is certainly built on very ornamental lines, but the lineman and practical man probably has no special regard for it. The steel domes, as a rule, are built on top of the brick tower of the central station and are merely intended for taking care of the short lines in the neighborhood of the central. These now prominent steel domes in a few years will be things of the by gone past, as the general tendency is now to bring the subscribers' line right into his basement, just as the water and the gas are. In several cities on the other side, particularly in Paris, this method is used practically without exception. It is an engineering feat of no small moment to design and construct such a wire tower as either of the photographs on this page illustrate. It must be remembered that a wire tower may be called upon to support many and severe strains, and, of course, must be designed to successfully withstand them throughout life.

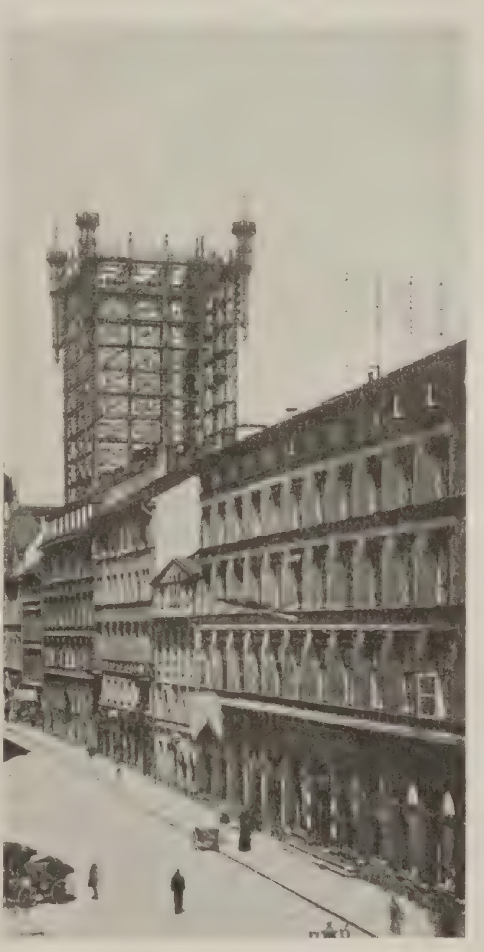


Fig. 2. Steel Wire Tower of the General Telephone Company at Stockholm, Sweden.

The Editor's Page

THE MEETING OF THE INTERSTATE.

NEXT week will be a notable one in telephone circles, from the fact that then will occur the annual meeting of the Inter-State Independent Telephone Association. The meeting will take place Tuesday, Wednesday and Thursday, December 8, 9 and 10. On those three days there will assemble at the Auditorium in Chicago one of the largest and most important gatherings of telephone men ever brought together. Telephony is yet in its infancy and such gatherings have not long been possible. Few outside of those directly interested realize the extent of this association, which was organized in the middle west less than two years ago. Whether at the coming meeting it is determined to enlarge the territory beyond the seven original states or not, its present scope and importance are impressive. If the exchanges in the association's territory are only fairly well represented at the meeting, still a great body of telephone men will be drawn together.

It will be an interesting body of men in more ways than one. They will be the men to whose courage and business acumen is due the great development in telephony which is destined to make the past decade forever notable. When we consider that ten years ago there was not an Independent telephone exchange in the country and that since that time the Independent movement has grown until to-day its exchanges outnumber those of the once great Bell monopoly, some idea may be gained, even by an outsider, of the importance of such an association and of the men who participate in its counsels. Organized to bring the Independent operators and the Independent manufacturers closer together in all their relations, social and commercial, the association has already wielded a wide influence and has held two very successful meetings. It has been a stimulant, especially to the smaller companies, and has in a marked degree raised the standard of construction among the farmers' mutual companies. If nothing further is accomplished, it still will have demonstrated its right to existence. But the association is only fairly started on its career of usefulness.

Perhaps the greatest danger confronting Independent telephony is not from without but from within. The companies must recognize and conserve their mutual interests. Lack of harmony among themselves would be a source of great danger and is to be avoided. Harmony is especially necessary for the proper adjustment of toll rates and distribution of territory. It was to secure this very harmony that the association was formed and it is doing great work in this direction. But there is another matter of immediate importance which requires the attention of the association and harmonious action among the members, and that is, what course shall Independent companies pursue toward a so-called Independent manufacturer, like the Kellogg Switchboard and Supply Company, which is not Independent at all but merely a Bell side show. There is no escape from this question and now is the best time to meet it. Here is a manufacturing concern that is playing fast and loose with the Independent telephone operators, masquerading as a friend, but in the camp and counsels of the enemy. What are the Independent companies going to do about it? The question must be met individually if not collectively. It seems to THE AMERICAN TELEPHONE JOURNAL that the Independent operators have come to the parting of the ways. Surely the place to meet such a question is in open discussion at a general meeting of the association. The matter should be handled without gloves. The Independent operators have plenty of work cut out for them at the coming meeting, but above everything else they should take a stand in reference to the Independent manufacturers and against this wolf in sheep's clothing. They should take this stand not only as individual operators but as an association. It will hurt the cause of Independent telephony seriously if it is allowed to go abroad that they have weakened in this important matter. The association should declare itself emphatically that there may be no mistaking the course to be pursued.

THE KELLOGG COMPANY A BELL CONCERN.

How to best meet Bell competition was the great problem which called the Inter-State Independent Telephone Association into being. No one will contend for a moment that the way to meet Bell competition is to lend aid and comfort to the enemy; to purchase equipment of a concern that is owned absolutely by the Bell people; that is here to-day and may be gone to-morrow. It is not at all probable that many of the Independents will do this, but the most effective way to deal with the problem would be for the association to declare its intentions and settle its relations with the Independent manufacturer definitely and beyond all dispute.

That the Kellogg Switchboard and Supply Company is a Bell concern is now pretty well understood, notwithstanding its name and professions. But there may be some who do not recognize this anomalous condition of affairs. A succinct and unequivocal declaration on the part of the association would go far toward clearing the atmosphere. A number of important questions are to come before the coming convention, but there is none more important than this which deals with an enemy, which, while professing friendship, is a direct and constant menace to Independent telephony. There is no middle ground for the Kellogg company to occupy. It can not look after the interests of the Independent operator and at the same time look after the interest of the Bell monopoly. It can not serve two masters. If true to one it must be false to the other. That a concern owned by the Bell people will work against the interests of its owner every thinking man will admit is absurd, to say the least.

TELEPHONE RATES: THEIR RISE AND FALL

By Herbert Laws Webb.

PERHAPS a more explanatory title might have been chosen for this article, but it would have had to be long and somewhat awkward in its dimensions What is to be attempted is to explain with reasonable clearness the reasons why the rates for telephone service are higher in large cities than in small places. Everybody knows that they are so, almost invariably, in fact practically without exception. I do know of an exception, but it is due to peculiar circumstances and has no bearing on the general principle.

Few people, however, know the reasons; and most people are ready to say, off hand, that there *are* no reasons, that the rate ought to be cheaper in a large system than in a small, because the more business you do the cheaper you can do it per unit. The layman invariably uses that argument and considers it unanswerable, and the telephone man has not always a convincing answer wherewith to crush the ignorant layman. The layman, however, would be right if only he measured the telephone service by the right unit.

This he does not do; he takes the telephone as the unit instead of the message, or, to be more accurate, the message-mile. And it is to be deplored that many telephone men help to perpetuate the layman in his error by taking also the telephone as the unit of the telephone business instead of the scientific *message-mile.* Once clearly fix in your mind that the message-mile is the true unit of telephone service and the difficulties of explaining why the service costs more in a large city vanish and crumble away before the army of reasons that arise to overcome them.

To a famous professor of political economy, who knew among other things, the prices of foodstuffs and materials to five places of decimals in the four quarters of the globe, the problem of determining equitable figures for telephone rates in large cities was propounded, and when he had looked into the matter with some attention, and had examined exhaustively, as one would expect from a learned professor, the various memoranda dealing with the factors in the case which had been submitted to him, he declared that in all his experience and investigations he had never met with a problem so difficult, or so much beset with delicate and obstruse complications. This, of course, was before the days of Independent telephone companies. Perhaps it might aid toward a clear understanding and an intelligent examination of the subject if we consider broadly the various items of expense involved in the supply of the service; we can necessarily only look at them in broad divisions, as the horse, foot and artillery, so to speak, of our army of factors; to consider them all in detail would need not an article, but a volume.

The broad divisions of telephone expense may be set down as follows:

(*a.*) Maintenance of Plant.
(*b.*) Handling of Traffic.
(*c.*) General Expense.

When these three matters have been settled there must be a gross profit from the revenue collected sufficient to meet

(*d.*) Reconstruction.
(*e.*) Depreciation.
(*f.*) Interest on Capital.

Now, as I have said, I am not going in detail into all the very numerous items that go to make up these broad general divisions of expense. But I do propose to show that the telephone user in the large city costs more under each one of these six general heads than the telephone user in the small place. And the reasons succinctly stated, are that he uses a greater average amount of plant and he requires a greater amount of work to be done in handling his traffic. It is clear that if the city subscriber uses a greater average amount of plant he will be required to contribute more under heads *a, d, e* and *f;* and if he requires a greater amount of work done on his traffic (of which also he generally originates more per day than the town or country subscriber) he will also have to contribute more under head *b*. And as *c* covers a multiple of items, that greatly increase in complication and in relative cost in a city as compared with a small town or a country place, he will also have to contribute more under that head too. So there is no way out of it for the city subscriber; he costs more and he must pay more.

To many it would not appear at first sight that the city subscriber does actually require a greater average amount of plant. But telephone plant is not elastic. If you have to serve a large district you cannot stretch the plant of a small district to cover it. But, says the layman, I in New York, am about the same distance from the exchange as my friend Jones is in Littletown. True, but Littletown has only one exchange and New York has twenty. Every exchange of those twenty must be connected with every other by direct trunk wires, and at every exchange there must be special switchboard equipment to operate those trunk wires.

In Littletown, the subscribers' lines average half a mile or so long, and the maximum distance of talking is a mile and a half or two miles. In New York, if it were served by one exchange, the subscribers' lines would average four or five miles. As a single exchange in such a large area is impracticable, several exchanges are used and the trunk lines between them serve to prolong, at any moment it may be demanded, a subscriber's line from its normal terminal to a point, perhaps a mile away, or perhaps twelve or fifteen miles away at the other end of the city. This trunking system of lines and switchboards is entirely additional to the ordinary subscriber's line and ordinary answering switchboard. Therefore it is clear that the city subscriber requires for his service a greater average amount of plant than the town or country subscriber. Consequently he costs more for maintenance, for reconstruction, for depreciation and for interest on capital.

If you consider twenty small exchanges, each serving a small town, you will see that each of those exchanges is quite a different organization from one of the groups of twenty in New York, or Chicago or Philadelphia. In the one case it is a self-contained unit, in the other it is simply a part of a great system. If you could imagine twenty small towns being, by some Arabian Nights' feat of magic, suddenly brought together to form a great city, their twenty telephone systems would be of little use to the great community thus formed until they had been entirely reconstructed and welded into one great organization. It would be necessary at once to lay an extensive trunk wire system, interlacing all the exchanges together, so that each would have direct communication with the other nineteen, and in order to bring that trunk wire system into relation with the subscribers' lines it would be necessary to equip all the twenty multiple switchboards with outgoing trunk jacks and to construct twenty other multiple switchboards for working the incoming ends of the trunk lines.

Clearly, therefore, all this trunk equipment, lines and switchboards, is extra; it is absent from the small town with the single exchange and it is absolutely necessary in the large city served by a multiplicity of exchanges. It is plain, then, that each city subscriber requires more plant than each subscriber in a small town. He requires to talk over a longer average distance, since the area over which he has communication is greater, and, until the day of wireless telephony arrives, the only way in which you can meet that requirement is by providing him with more wire.

Regarding point (*b*), the handling of the traffic, this is an item of expense that diffuses itself so much over labor costs and over plant costs that it is difficult to draw the line and to say precisely where the costs directly dependent upon traffic stop.

Broadly speaking all telephone costs are traffic costs, as if there were no telephone traffic there would be no need for any telephone system. But we are naturally compelled to charge the traffic against the originating subscriber, just as the writer of a letter usually pays for the stamp although the recipient may be more greatly benefited than the sender.

When we come to consider the subscribers as individuals, instead of an average person having no real existence (which is the common point of view), we see that their demands on the traffic vary very widely. Some originate almost no traffic at all, but get value out of the service by receiving messages; others are almost continuous users of the service. We now recognize this in our rate schemes, at least some of us do, and so arrange our charges that the small user gets what he wants at a price which he can fairly afford and the large user pays in some proportion to the facilities he enjoys.

Carrying this principle through to the costs of producing the service, we see that certain costs are inevitable anyhow, whether the subscriber uses the service much, little or practically not at all. Even if he only gets one call a year he must have a station, he must have a line to the central office, and there must be at the central office some means of connecting to his line. Therefore the station, the line, and a certain modicum of central office plant are fixed charges, regardless of traffic. I say "a certain modicum of central office plant," advisedly, for here is the first point where plant costs begin to vary with traffic. The large user requires more central office plant than the small user; that is plain, since the higher the average traffic per line, other things being equal, the fewer lines can be placed at a position. That proposition holds true even in considering a single exchange system. When we come to consider a system composed of a multiplicity of exchanges it is evident that all the trunk line plant is directly a function of the traffic. Without trunked traffic there would be no need for trunking plant, switchboard and lines.

Every exchange in a large system is fully equipped to complete connections local to that exchange exactly in the same way as in a single exchange system. The trunk line plant and the trunk line operators are extra facilities provided for the exchange of communications between one central office and another, and those extra facilities are provided in direct proportion to the traffic to be exchanged. Thus the handling of the traffic in a large system is obviously more complicated and more expensive than in a small single-exchange system. This extra complication and extra expense begin to appear directly a single exchange system splits into a two-exchange system, and they grow as the area served increases in size. The extreme of such complication and relative expense is to be found in London, where the area served at a uniform rate is some 630 square miles, where there are between fifty and sixty exchanges, and where subscribers can talk between points thirty miles apart as the crow flies—when he can see his way, which is rarely.

So we see that as regards five out of the six broad divisions of telephone expense—maintenance of plant, handling of traffic, reconstruction, depreciation and interest on capital— it is clearly demonstrated that the supply of telephone service per user is more costly in a large system than in a small one. It may all really be summed up by saying that the average amount of plant employed by each subscriber is greater and the average distance traversed by each message is greater. If the true unit of telephone service—the message-mile—were universally employed and understood, the proposition would need no demonstration at all, it would be evident to the meanest comprehension.

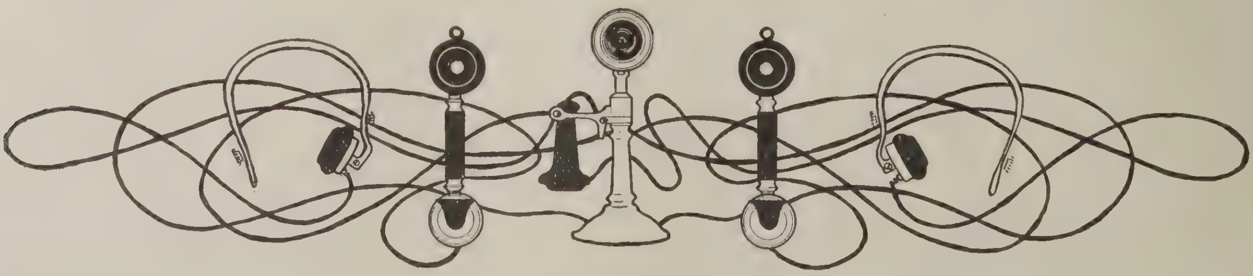
When we come to the question of general expense we touch more delicate and debatable ground. At first sight it would look as if centralization, here as in other industries, should reduce the cost of administration. It would probably turn out, if the actual work done were closely analyzed on its proper basis, that it really does and that the message-mile in a large system bears the least burden of general expense. But measured by the more conventional unit of the subscriber there are evidently many reasons why it should be otherwise. The work is far more complex and requires greater and more highly skilled supervision. The specialized departments into which the staff of a large telephone company do not exist and are not required in a small concern. The very work of recruiting, training, organizing and supervising this large body of workers accounts for a goodly proportion of general expense. Then legal expenses, taxes, rents and a host of other items are materially higher in large cities than in small towns.

That brings us to a broad underlying cause of higher costs in large cities, which is that all costs are absolutely as well as relatively higher, and this is a fact too well known to need elaboration. For the reasons pointed out above, the service would cost more to produce in a large city even if all such items as salaries, wages and rents were exactly on a par in all places. But it is common experience that they are not. Labor and rents are very much dearer in large cities than in small towns, so are all transportation charges, rights of way and many minor items.

In actual telephone material there is no diffecence in one sense though there is in another, since a higher standard of work is demanded in large and complex systems than in small and simple ones. The cost of doing underground work is distinctly greater in large cities than in small towns, because of the more costly nature of the pavement to be disturbed and replaced, the greater complication of the obstructions met with below the surface and the higher pressure at which the work must be done in order to reduce disturbance of street traffic to a minimum. And so on; any telephone man who has worked in a large city and kept his eyes open can add to the catalogue *ad infinitum.*

It might be pointed out in conclusion, that the principle has been recognized in practically all telephone rate schemes in all countries. In Great Britain, London has the highest rate, in France, Paris, in Germany, Berlin. It is of interest to point out that although Londoners have grumbled at the telephone rates in the past, and the government decided on competition, when the practical branch of the government—the Post Office—came to carry out the competition they adopted the same rate as the company had always charged for unlimited service. In Germany at one time the rate was uniform in places of all sizes, from Berlin down to Pumpernickel. But recently a new rate scheme was adopted and in Berlin and Hamburg the rates were raised, while in many small places they were lowered.

The same principle of higher rates in large cities obtains also in Austria, Belgium and Scandinavia. In Switzerland there are practically uniform rates, but there are no large cities. The curious exception I referred to is at Stockholm, where the Swedish State Telegraph Department charges a lower rate than it does in smaller towns in Sweden; this is done with the object of driving a company to the wall. The company is still on deck, however, and has still by far the larger system in Stockholm.



THE TELEPHONE IN WEATHER BUREAU WORK

By Henry Merriam Gage.

IN the use to which it is put in the service of the United States Weather Bureau the telephone has without doubt reached its highest efficiency. The entire marine and agricultural interests of America secure notices by telephone from the weather stations as to what the day is to be. The benefits conferred are incalculable. In many of the agricultural regions telephone companies have discovered that the leading inducement to farmers contemplating the installation of telephones in their places is that they will thereby secure every morning the prediction of the weather for the day. In many ports, insurance companies will not issue policies in favor of vessels unless the owner or captain has arranged to secure a telephone service from the nearest weather station.

Weather Bureau Station Equipment on Top of the Bureau Building at Washington, D. C. Observer at Work, Showing Apparatus Used in International Cloud Observations.

In the important and humane work of the life saving service, the telephone is wholly indispensable, connecting the stations with the Weather Bureau's offices, whereby the life savers are advised from hour to hour in regard to the portents of all kinds of storms. A unique employment of the telephone is being made in international cloud observations, a work of profound value to mankind, and one which gives promist to revolutionize the whole data of meteorology and of raising weather predicting to a higher place than it has even held among the exact sciences. This phase of the utility of the telephone will be discussed further along in this review.

The Government's regular service telephone bill for distributing forecasts amounts to only $8,655.93 per annum, most of the companies sending out these notices gratüitously to patrons. In addition to that sum, there is an annual expenditure of about $800 for warnings telephoned under contract at so much per week, the rates ranging from five to twenty-five cents. These are over lines in remote and somewhat inaccessible portions of the country. As the telephone, serving as a medium for circulating advance notices of storms, has at times effected a saving of over $30,000,000 to marine interests alone in safeguarding vessels against a single hurricane, the interest on the investment is, as may be seen, very great. In Florida and California and in other fruit growing sections, the telephone announcement to farmers and shippers of impending cold waves has not infrequently resulted in a saving, in one day or night, of fruit, vegetables and other property amounting to several millions of dollars in value.

On December 19, 1901, for example, Washington telegraphed Jacksonville, Fla.:

"Temperature will fall to about 20 deg. at Jacksonville to-night, with temperature below the freezing point as far south as Jupiter. Emergency warnings and notify postmasters."

Every telephone center in Florida was instantly notified, and the telephones to every village and plantation rang with the warning, resulting in the protection in one night of over $1,000,000 worth of perishable products.

In addition to the scientific study of the weather conducted at Washington, there are forecast centers at Chicago, Boston, New Orleans, Denver, San Francisco and Portland, Oregon. For all sections of the country not included in these districts forecasts are prepared at the National Capitol. The meteorological observations are sent to Washington by telegraph, an ingenious code having been devised in the interests of economy, and in the distribution of the forecasts based upon the data thus obtained from nearly 200 government scientists and about 14,000 voluntary weather students co-operating with the government, the telephone plays a leading part.

In the great shipping centers of the United States the daily use of the telephone for the distribution of weather forecasts has become a regular part of commercial transactions. Before the telephone companies took up the work of gratuitously circulating these forecasts the labor of the weather stations in getting predictions to the offices of shippers was prodigious. In Chicago, for example, it had grown to such proportions that Professor E. B. Garriott, who has charge of the marine forecasts in the Weather Bureau, made a trip to that city for the purpose of expediting this service. He found that the time of the station was almost entirely consumed in furnishing telephone announcements to the eager shippers. Professor Garriott took up the matter with the telephone companies of Chicago with the result that they now devote a portion of the morning to circulating the forecasts.

Although the Weather Bureau at Washington and all its subsations instantly, upon the computation of weather conditions, issue their predictions, these announcements being heralded broadcast, both through the department of publications, a remarkably efficient bureau under the direction of John P. Church, and by the extensive use of the telephone, the entire service is in such demand that the scientists are frequently called up by citizens not only in the city where the station is located, but from distant centers, anxious to get the very latest scientific predictions.

The American Geographical Society estimates that the annual return on the cost of the yearly maintenance of the system amounts to 2,000 per cent. It is interesting to recall the curious disdain with which seafaring men first regarded the weather prophets. That a Weather Bureau display-man could go to a telephone booth and there obtain information of coming storms no signs of which were apparent to skippers who had spent their lives in navigating the seas was looked upon as one of the bizarre pretentions of unpractical college men. But when time after time demonstrated that the prophecies based on scientific study of the elements and communicated to display-men along the coasts by telephone were borne out by the events of the weather, the men that sailed ships began to realize that there was something in the system far above and beyond their nautical experience.

In fact, in recent years there has been but one conspicuous act in defiance of the telephoned warnings of the Bureau. Scientists of the Boston district had observed the signs of a coming storm and telephoned messages had been hurried to every display-man along the coast. In defiance of these warnings one vessel, a steam boat, the "City of Portland," was ordered out of the harbor of Boston. She was lost at sea with all her passengers and crew.

An impressive thing about the quick service made possible by the emergency use of the telephone is that storm warnings are sent along the coast many hours before the slightest symptoms of change are there discernible. For example, on Wednesday, the 7th of October of this year, the conditions from Point Isabel, Texas, to West Quoddy Head, Maine, seemed to show even to the most experienced mariner, that the weather would continue fair. Meteorologists, however, read the signs of a coming gale that would sweep the whole Atlantic coast, and that fact was telephoned from point to point, by government telephone cable, from the headlands of Maine to Point Isabel. Hundreds of vessels that were about to weigh anchor remained in the various harbors and as a result cargoes and craft aggregating in value many millions of dollars were saved. As the scientists had predicted, the gale came. Eighteen coastwise steamships and sailing vessels whose captains had with hardihood put out to sea in spite of the warnings telephoned to them, encountered shipwreck.

Valuable as the telephone is in ordinary dissemination of weather forecasts, its service in enabling scientists at various observatories to study simultaneously the same cloud phenomena gives promise of proving of even greater benefit to the people and country in general. The method of using the telephone in this upper air research is peculiarly interesting. While studying clouds through their theodolites and measuring, by means of the nephoscope, the relative velocity of the upper currents of the air, the scientists on their observatories on the tops of tall buildings, now keep in communication with one another by telephone. A flexible telephone tube in front of them enables them to agree, without pausing in their observations, to focus their instrument at the same point of cloud, and the second ticks of an electric central clock at the Weather Bureau is connected with the telephone, so that the observations are made at the identical instant of time.

It is expected that this scientific work will profoundly effect meteorological science, since the real storm origins are to be found in the upper atmosphere. "The construction, by means of the telephone, of this system of simultaneous study of cloud phenomena," said one of the Weather Bureau experts, "has put us in possession of a method of discussing several important fundamental characteristics of the atmosphere, and it is evident that a continuation of research along cloud lines will not only tend to make of meteorology an exact science, but will also enable us to construct accurate daily weather maps of elevations one to two miles above the surface."

In the new system of forecasting, two scientists, instead of one, will be detailed to each station, for the great importance of the work is based upon the simultaneous cloud readings at different angles, made possible by the co-ordinate study at the same instant of time through telephone arrangement. This new method enables the scientists to explore with precision the stratocumulus cloud level which, in Washington, is about 10,000 feet or 3,048 meters above the surface. Invoking the telephone to enable them to make simultaneous observations of the same upper stratum from different points of view, the scientists have been able to demonstrate that at this mean height of 3,048 meters the maximum gyratory cyclonic components exist.

"These," said Professor Bigelow, "are most concerned in storm generation and activity. It is the level at which the great horizontal currents move with the least disturbance from surface obstructions or from the permanent eastward drift of the higher level. Storms should be interpreted at that level as far as possible."

The collaboration of meteorologists working on the same upper air problem at the same instant of time and being enabled so to do because of communication one with the other by telephone, so far increases the scientific grasp upon the factors entering into the behavior of the lower atmosphere, as to promise a radical improvement in the success of weather forecasts. As has been stated, 85 per cent of the prophecies now come true, and it is not an over-sanguine hope to expect that the telephone equipment in the new meteorological science will reduce the margin of failures to an inconsequential minimum. The telephone arrangement in this new system was devised by Professor C. F. Marvin, in charge of the instrument division of the Weather Bureau, and installed by J. H. Robinson, chief of the telegraph and telephone division. "Both of these officers," said Professor Bigelow, "have contributed materially to the success of the work."

The instruments used in the new science in which the telephone is playing so important a part were constructed, Professor Bigelow explained, on a foundation of cement on the flat roof of the building. A wooden frame about 40 inches square was laid down to outline the cement; a box having its bottom partly covered with bars, but furnished with a full stop, 36 inches square, was sunk into 3 or 4 inches of cement which closed firmly above the open-bottom boards and gave sufficient weight to the base. The tripod of the theodolite was placed upon the top of the box, and a platform built around it, so supported as to be entirely isolated from the foundation, since it rests itself at the edges of the walls, and is completely free from the tripod. A truncated pyramid of wood was constructed around the tripod, having the same general shape, and carrying a round table for the use of the observer. This has been found convenient also for disposing of the timepiece, the recording hooks, and the telephone tube.

Within the wooden case are placed the telephone and battery, which are thus suitably protected from the weather; a movable galvanized iron hood was fitted over the instrument, and it could be fastened securely to the table, and thus effectively shield it from the weather when not in use. From the telephone a flexible tube passed through the table to the mouth of the observer, and a long thin tape carrying the wires of the receiver, fitted over the head by means of a spring, complete the signalling arrangements. The standard clock of the Weather Bureau has a break-circuit apparatus for two-second intervals, and it also omits the fifty-eighth second. A common telegraph sounder was screwed upon the outside of the telephone case, and the clock beats are thus distinctly heard throughout the circuit. The chronometers on the table facilitate the identification of the clock beats, and the fact that the observers hear the same seconds toll off, make it possible to fix the setting upon the cloud at an appointed second, usually the first of the minute, with remarkable precision.

MODEL EXCHANGE ARRANGEMENT

By H. P. Clausen.

PROPER laying out and distribution of apparatus necessary for the construction of a telephone exchange equipment does not always receive the attention it is entitled to when buildings are designed or selected for telephone exchange service. As a rule, an exchange equipment is purchased and the switchboard manufacturer is required to fit the apparatus in whatever rooms or space there may be for the purpose. Therefore, an article discussing the different elements entering into the construction of an exchange equipment and the probable space occupied by each element, as well as the best relative location of the elements, should be of interest to telephonists.

First, let us assume that we are going to construct a building which shall be given over to the exchange service exclusively, and that the building shall consist of two stories and a basement. Fig. 1 is the floor plan, and Fig. 2 is the second or exchange floor layout. The basement layout is not shown, as probably the basement would only be used for the incoming underground cables and store rooms. The roof over the second floor is not shown, as local conditions might call for an additional story in which to locate the clerical departments of the company. In case a third floor is not provided, it is the best plan to provide the second floor with such a roof as will allow plenty of light to enter the exchange room.

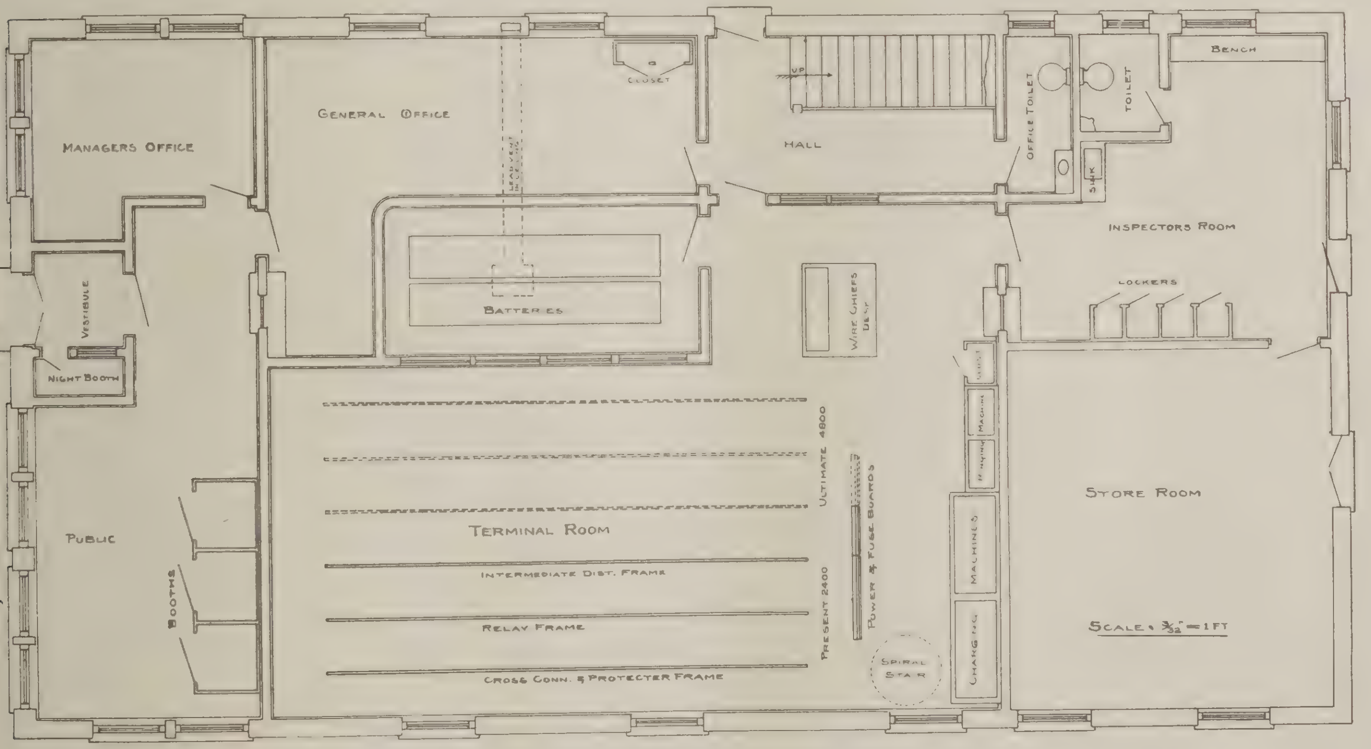


Fig. 1. First Floor Plan of a Model Telephone Exchange. Capacity, 2,400 Lines.

Referring, first, to Fig. 1, the first floor layout, there is, at the street entrance, a vestibule, and as the waiting room is entered to the left is located the manager's office, and immediately in front, the entrance to the general office. In passing through the general office, the rear hall is reached, which contains a side entrance as well as a stairway leading to the second floor. This hall also faces into the office toilet. In the public waiting room, it will be observed, there are placed several telephone booths. These are for the regular public service. For night service, and when the public waiting room is closed, there is a night booth accessible from the vestibule. This feature of making a night booth accessible from the outside during any hour of the night is an excellent plan, and may be adopted with profit.

In order to give admission to the inspectors and general exchange workmen, two entrances are provided: One for the inspector's room, and another for the store room. The inspector's room contains a toilet, sink and lockers. The apparatus room can be reached from the inspector's room, as well as from the hall. The terminal room contains the cross-connecting and terminal racks, the coil and relay racks, the intermediate distributing board, the wire chief's desk, the power board, and fuse board, charging machinery mounted on piers, and also the necessary ringing machinery. There is also a second room in which is placed the storage battery. For the purpose of carrying off the fumes from the storage batteries, a lead-lined vent pipe is connected to a flue, as indicated.

For the first floor layout, all of the apparatus: the manager's office, the public waiting room, a store room, and the inspector's room, have been located. Each entrance to the different departments is reached through proper channels without necessitating any annoyance by one class of employees going to their places of work through rooms occupied by another class. The underground cable should come in via the basement, and may either enter from the street or from the side, depending on local conditions.

Passing to the second floor, in the front portion of the building, the exchange layout is located. The switchboard reads from left to right and makes a turn at the front of the building to the right and returns along the opposite side of the room. The drawing calls for an immediate equipment of 2,400 lines, with provisions for an ultimate of 4,800 times.

The switchboard contemplates 120 lines per operator's position. The first section of the board is given up to trunk service from the toll board. It is obvious that by increasing the number of subscribers per operator's position, the switchboard would not extend to the limits shown. In an exchange equipment, where there is likelihood of an increase to or above 3,500 subscribers, it is not thought wise to increase the number of subscribers above 120 per operator, particularly when party-line service must be handled. When party-line service is given extensively, the 120 lines per operator's position is too great a number for the average operator to handle efficiently.

In the exchange room there are placed two desks: The combination information and chief operator's desk and one monitoring operator's desk. Near the first section of the switchboard there is a doorway leading into the toll room. The toll switchboard has an immediate capacity of two sections with allowance for an extension to an ultimate of four sections, or eight positions. The toll boards are equipped with two positions for each section, and a calculagraph is placed between the two positions. The arrangement of this tollboard may be modified and the number of sections installed can be increased by slight rearrangement. The main object in view is to provide a room large enough for any probable extension in the toll service of an exchange having an ultimate of 4,800 lines.

It will be observed that the toll room is equipped with a recording operator's desk. The operators reach the exchange room from the side entrance on the first floor. Passing up the stairway a small hall is reached, and to the right, the entrance to the exchange room is located, while to the left there is the entrance to the locker room, and immediately to the left, in the locker room, a door leads into the operators' toilet.

Recapitulating, there is on the first floor the public waiting room and telephone booth, the manager's office, the general office, a rear hall, the inspector's room, the store-room and the apparatus room, containing the cross-connecting apparatus, terminal and protector equipment, intermediate distributing board, storage batteries, wire chief's desk, the power board, fuse board, battery charging dynamotors and ringing machinery, while on the second floor there is the entrance hall, the main exchange operating room, the toll room, operators' retiring room and toilet. The drawing is to scale so that it will permit anyone to determine actual dimensions required for any portion of an exchange equipment, having an immediate capacity of 2,400 lines, 120 lines per operator's position, and provisions for permitting an ultimate 100 per cent. increase.

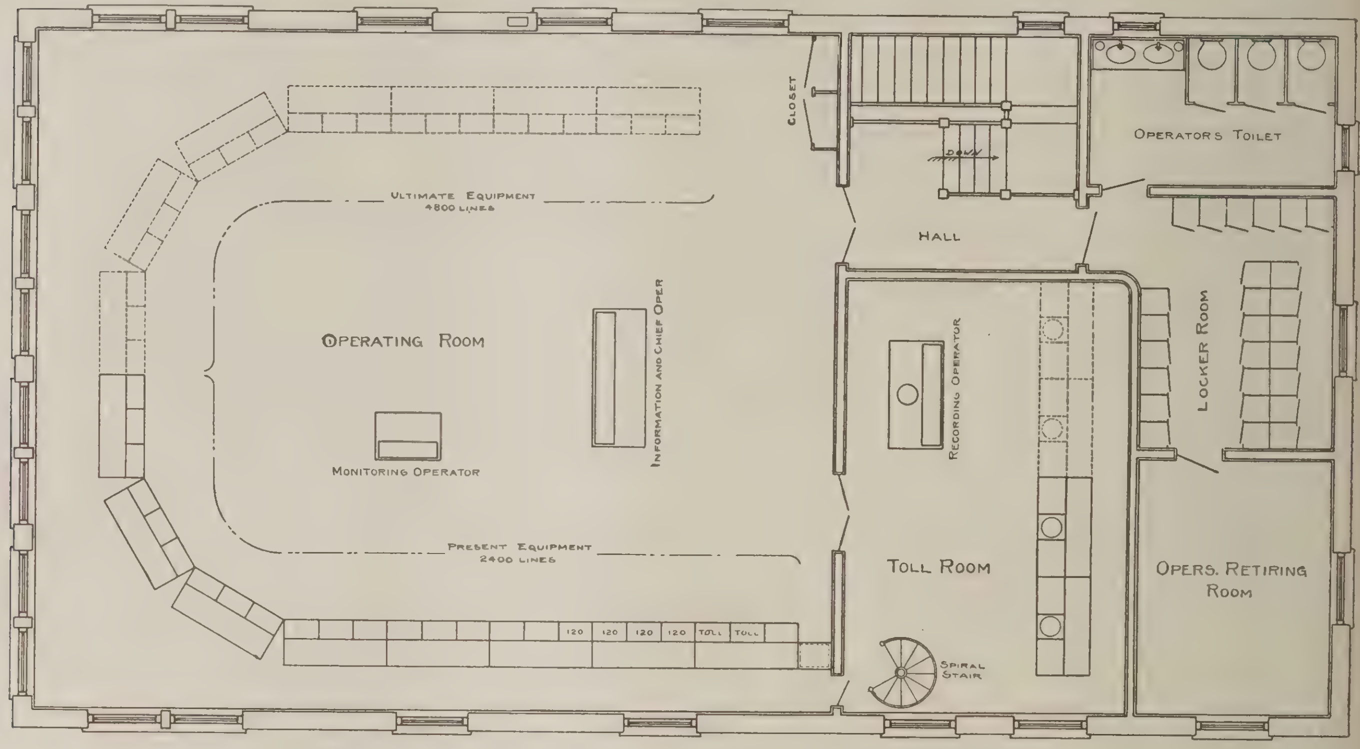


Fig. 2. Second Floor Lay Out, Showing Arrangement of Switchboard Equipment.

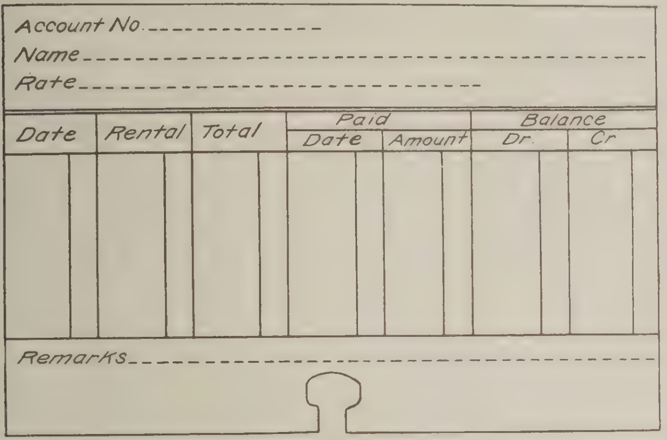
A TELEPHONE ACCOUNTING CARD SYSTEM

By G. Arthur Jackson.

SOME telephone accountants who have been trained to the older method of using bulky books do not take to the more up-to-date one of keeping their accounts on cards, and the only reasonably void argument that they can advance against the newer system is that a card may become lost and thus there will be no record of that particular account. In practice it is found that a card is practically never lost and that there is about as much liability of losing one where good methods are used as there is of losing a day book. All of the good card system concerns now manufacture boxes in which the cards can be automatically locked, so that there is no possibility of their being lost. The locking is accomplished by merely turning a thumb screw on the front of the box. Those who are familiar with the use of card systems for telephone accounting advise the use of some such locking device as the one described. The accounting system here treated will be handled under three heads: subscribers, rentals, tolls and supply department accounts.

Subscribers' Rentals.—This branch of telephone accounting is one of the most important, and very easy to get out of balance. The basis of a rental system on cards is "account number," the cards should be numbered from No. 1 upward, then the subscriber's name, rental rate, and at the bottom of card space for remarks. Whenever the term of rental begins, charge each subscriber in the rental column. When subscribers pay their rental credit in "paid" column. If rebate is allowed credit in red ink, so as to distinguish between a cost payment and an allowance.

When a subscriber pays his or her rental take out the card from the rental box, credit the amount paid, and place card in cash box, which is indexed under the days of the month from 1 to 31. The same is done with a rebate, except that the card is filed in the rear of the other cards. The balance of accounts receivable at the first of each month is the balance on cards left in rental box plus the balance in cash. File on subscribers who pay on account, or are rebated a certain amount. After a balance has been found to agree take out of cash file and place in a "paid" file all cards that have no balance in numerical order. The cards that have balances place back in "rental" box. All that is necessary in addition to cards is a small journal to make entries of additional charges and rebates. The posting is made from this journal on cards. When cash is paid by a subscriber it is credited on a cash slip, and posted from this slip on cards. Those cards under each tab in cash file are the cards to be credited. This does away with an index. The total amount of cash taken in each day is credited to accounts receivable in cash book, and should agree with amount posted on cards under each tab in cash file. The total amount of cash paid in during month is credited to accounts receivable, together with additional charges and rebates. This gives rental balance that should appear on cards each month.


Account No ______________
Name ______________
Rate ______________

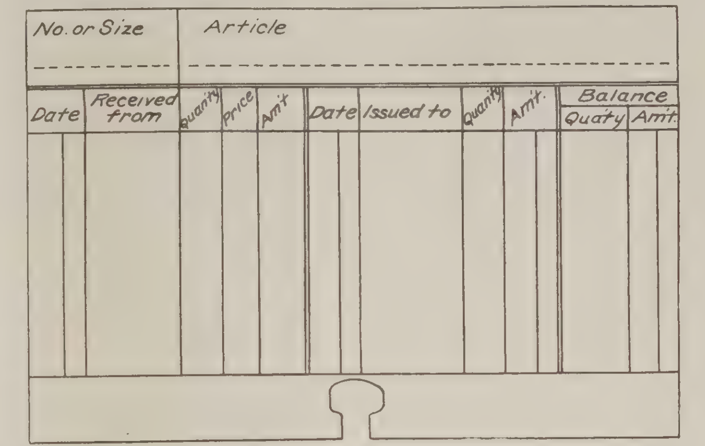
Date	Rental	Total	Paid		Balance	
			Date	Amount	Dr.	Cr

Remarks ______________

Subscriber's Rental Account Card.

Tolls.—This branch of the business, while sometimes secondary in receipts, is another very important factor, just as essential in detail as the rentals. Again the account number is the basis, the subscriber's name and telephone number being on the card also. The tolls are charged up monthly in the toll column; messenger service is charged separately in a column by itself. The same system is used as that with rental cards. Keeping the cards in this way makes it impossible to get toll accounts confused with the rental accounts, which is a very important matter. An accounts receivable with tolls is kept in the general ledger. Rebates and additional charges are conducted in the same way in a small two-column journal.

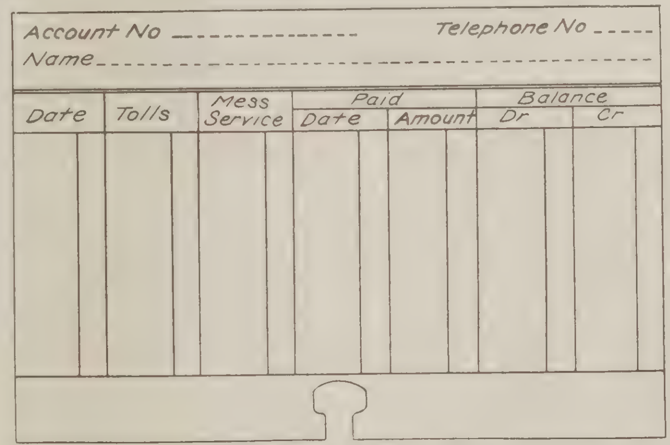
Supply Department.—This branch of telephone accounting is to my idea the most important of the three given. It is much easier for errors to occur here than in either of the other two. The form given will answer all purposes in the way of supply accounting. When one invoice is properly checked and known to be correct as to amount, price, goods received, condition, etc., it is entered on this card, also charged to supply account in the ledger. When goods are sent out or delivered from the stockroom a monthly report of same is given, and each card is credited its share of material used. After each report is given a balance of stock is taken from cards and given the stockman to check up his material in stockroom to see if same agrees. This card not only furnishes a stock inventory, but an inventory of value The balance in value each month should agree with the general ledger account. This system is being used in some of the largest companies in the country, and can be recommended as accurate and systematic.


No. or Size ______ Article ______________

Date	Received from	Quanity	Price	Am't	Date	Issued to	Quanity	Am't	Balance	
									Quaty	Am't

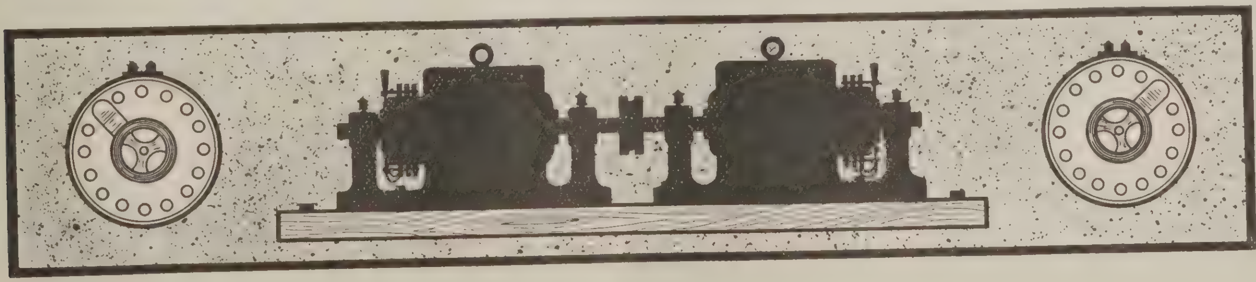
Supply Department Account Card.

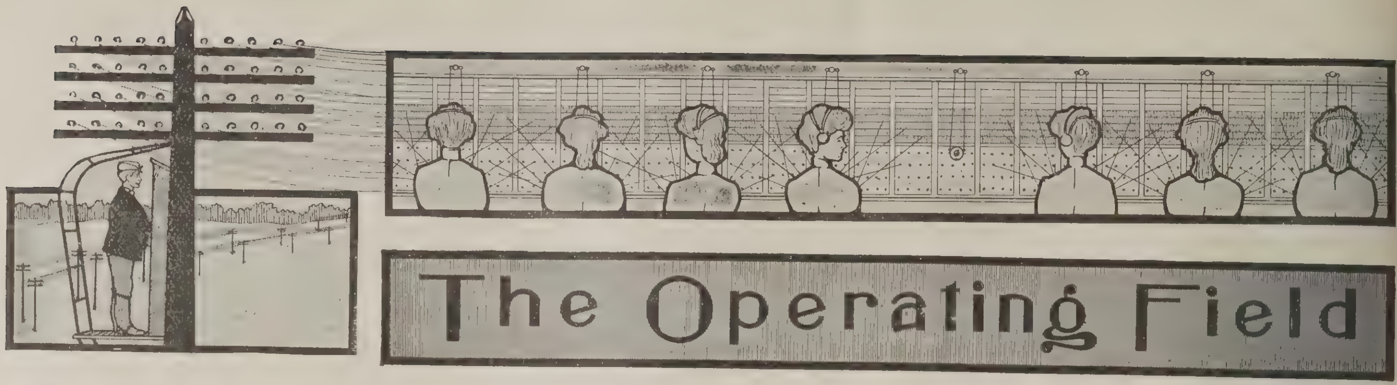
Summary.—There are a great many other branches of the telephone business where cards can be used to great advantage. A record can be kept to correspond with rental cards having on them the following: Account number, name, address and rate. This record is used in making out rental bills. Any changes on cards in rental box are made also on these cards. This enables the person who makes out the bills to go on with the work without hindering the bookkeeper. I would suggest the cards for all three forms be printed on both sides to save space. This system is simple and can be carried out in either large or small exchanges where its installation will be found well worth while.


Account No ______________ Telephone No _____
Name ______________

Date	Tolls	Mess Service	Paid		Balance	
			Date	Amount	Dr	Cr

Toll or Long Distance Account Card.





The Operating Field

TELEPHONE SYSTEM FOR WABASH RAILROAD.

THE greatest innovation that has been introduced into the railroad world for some years is to put into use on the Wabash. The plans have all been made and the building completed, so that all is ready. Long distance telephones will be installed all along the line of the whole Wabash system. Every office on the system will be connected with this service. The plan has long been in consideration, apparently, by the officials, as it developed lately that the greater part of the construction work for the telephone lines has been done. The whole length of the old road from Toledo clear through to St. Louis has been wired and the linemen and operating forces are at work now in squads on the Detroit division between Montpelier and Detroit, and on the Chicago division. The wires on the old road division, from Toledo to St. Louis, were laid last summer, when the block signal system was being installed. The construction work on the other divisions is being rushed.

I. P. Pharo, general foreman of the Wabash system, and of all the allied Wabash lines, was in Toledo, Ohio, recently looking for men and looking over the work already done in that city. Mr. Pharo has charge of the construction work and is acting under orders to finish it and have it ready for use as soon as possible. When the telephone system is installed and is in thorough working order, it will in all probability abolish more than half the telegraph business of the road. The telephone lines will be the exclusive property of the Wabash railroad and will be operated by the railroad company only for railroad business. The idea is expected to be an enormous money saver, partly in the time saved and partly, also, in less cost of maintenance.

The system will be operated in every way on exactly similar lines to the long distance telephone service of the big telephone companies. The same system of making and handling calls will be used. An operator will be located in every town and station where the telephone system is installed and in the small stations along the line, the station agent will be his own operator. The simultaneous system now used by many railroads will be used here. While all the plans of the Wabash have been completed, the officials are not ready to make any announcement as yet of the new service. It is probable that it will be completed and in working order all along the line within the next couple of months, but the officials of the road will say nothing about it.

NUMBER NOT "CALLED BACK" IN CLEVELAND.

OBEYING an order that went into effect recently, operators employed by the Cleveland, Ohio, Telephone Co. no longer call back the telephone numbers as they are sent in by subscribers. In issuing the order against recalling the numbers the Cleveland Company begins upon an innovation in the telephone business of the country, for in every large city in the United States the practice of having operators call back numbers is in vogue. For this reason the experiment will be watched with unusual interest. In investigating results that might be obtained by reason of the change the officials of the company have compiled some interesting information. The change is made almost entirely upon the supposition that time will be saved and in the long run the service improved. It has been figured out that the recall of a number by the operator consumes on an average one and one-third seconds. This in itself is scarcely to be considered, but the management of the company say they figure upon the basis of 180,000 calls each day. At the rate of a second and one-third for each call it has been figured out that the new order will result in the saving of some forty hours each day in time. Turned in another direction the saving in time will amount to the services of practically five employees a day.

The officials of the company are of the opinion that subscribers' will appreciate the change after they have become accustomed to having their calls for a number treated with silence on the part of the operator. The claim is made that the great majority of telephone users pay no attention to the recall of the number. The statement is also made that "out of an average of 180,000 calls daily less than 300 corrections are made on the recall." There was some complaint because of the change. The officials claim that the number of complaints are small when it is taken into consideration that a change of method is being put into effect. If successful in Cleveland, it is expected that the new method will be adopted by all the large systems of the country.

A $10.00 PRIZE CONTEST.

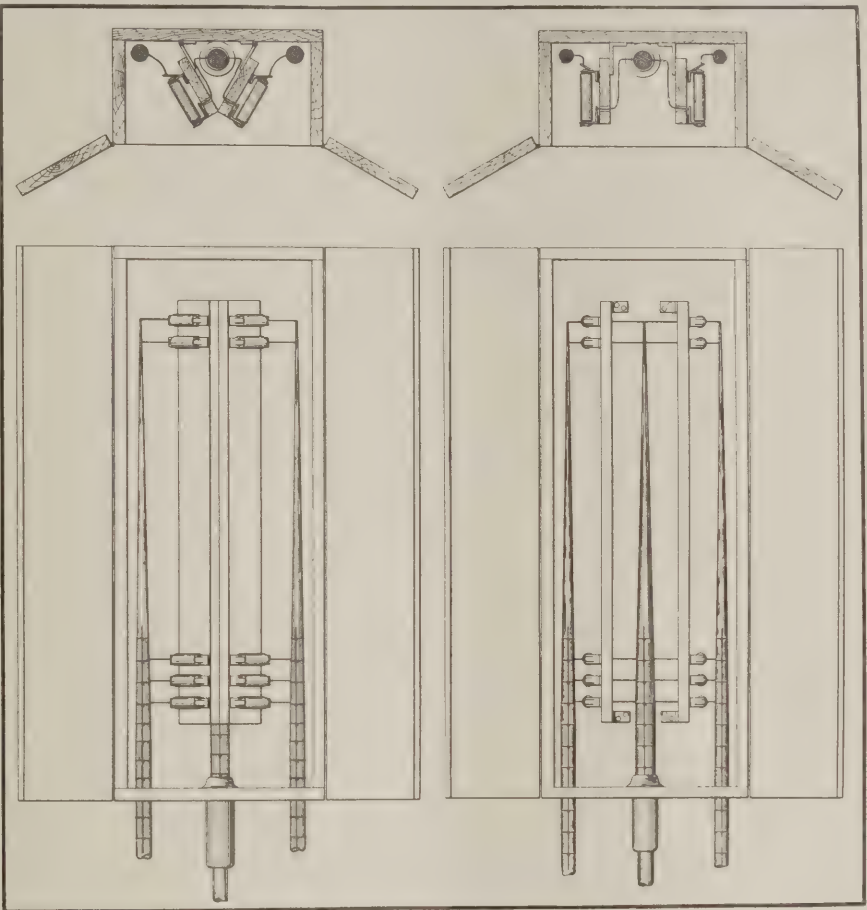
THE American Telephone Journal has decided to give a prize of $10.00 in gold monthly, starting with January next, for the best article on any telephonic subject received during each month. The authors of these articles will not be limited in their choice of a subject. Any branch of the telephone business may be treated. We expect to receive among others, articles covering phases of line construction, conduit work, exchange accounting, exchange construction, trouble locating, storage battery work, testing, designing, exchange operation, installing and circuits. Prizes will not be awarded on a rhetorical or literary basis. The decision will be based on the value of the matter treated to practical workers. If the article lacks finish, that will be attended to at this office. All articles are to be illustrated by either sketches or photographs. Finished drawings are not necessary. All that is required is a rough pencil sketch, distinctly drawn for our illustrating department to work from. Manuscript is to be written plainly with ink or typewritten on one side of paper only. Be sure that your name, address, and title of article is on each drawing and photograph and also on the manuscript. The article should contain from one thousand to fifteen hundred words. (1,000-1,500.) We reserve the right to print any article submitted in these contests not receiving a prize and pay for it at our regular rates. Address all articles submitted for the contest to the Editorial Department, The American Telephone Journal, 116 Nassau St., New York City, and label plainly: For the January Prize Contest.

A SENSIBLE FUSE STRIP MOUNTING.

By P. J. Eubanks.

BELIEVING that other telephonists beside himself must have experienced difficulty, and have perhaps been tempted to indulge in language more expressive than elegant, when endeavoring to clear trouble in pole terminal boxes, in which tubular fuses have been mounted in the manner prescribed by the manufacturers, the writer will explain the method of installation employed in an exchange recently built under his supervision.

When the tubular fuses are installed in the customary manner, they are quite inaccessible and have the additional disadvantage of occupying an unnecessary amount of space in the cable box. Aside from this, the old method of fastening the strips by means of L or angle iron fastening devices, as shown in the figure, places the bridle wires under the fuse strips between the fuses and the side of the cable box, where it would be an utter impossibility for a repairman to re-solder a defective connection, without having first unscrewed from the box and removed an entire strip of fuses. This takes considerable time and probably necessitates the disconnection of one or more subscribers' lines, with the attendant interruption to service and dissatisfaction of subscribers.



To eliminate the objectionable features above mentioned, the writer evolved the scheme of substituting for the L fastening device, a pair of strap or butt hinges. The drawing plainly shows the arrangement. This method of fastening gives great flexibility, allowing the fuse strips to be swung in any position when it is necessary or desirable to make repairs.

The normal position of the fuse strips when not swung back for repairs, is in the shape of a letter V. Swinging from both sides the two strips meet in the center of the cable box, where they should be fastened together by means of a hook or other suitable fastening device. When in this position the fuses entirely cover the pot-head, entirely protecting it from mechanical injury.

The fuses being on an angle of about 45 degrees and all facing the front of the cable box, are easily accessible for repairs, as are the bridle wires, which can be fully exposed by swinging the fuse strips so that one will overlap the other.

NEW DIRECTORY FOR FAYETTE COMPANY.

THE Fayette Home Telephone Company, of Lexington, Ky., on the first day of December, issued its new directory which contains the names of the local and long distance points reached by the company's lines and the number of subscribers in all of its exchanges. In Midway there are 125 subscribers and the number is increasing gradually. Versailles, Ky., has 415 subscribers, and the list is rapidly growing. It is expected that in the next few months it will reach the 600 mark. In Lexington, Ky., there are 2,250 subscribers, and new subscribers are being added every day. Dating from May 1, 1903, the increase has been over one-half at Midway, one-third at Versailles, and at Lexington about 25 to 30 subscribers per month. No soliciting is done at any of the exchanges. The Midway plant has been reconstructed, and a 100 line section has been added to its central equipment. The plant has also been changed from grounded to metallic circuit. Over forty-five miles of country line has been added. The Versailles exchange is being reconstructed entirely. Over 1,500 feet of aerial cable will be used, and two new sections of switchboard installed and added to the present equipment. This will give an equipment for 600 lines. There has also been added to this exchange over 80 miles of country line. The Lexington exchange has more contracts for country subscribers than can be handled readily. The company has been installing pay stations all over the central part of Kentucky, Indiana, and parts of Missouri, and Ohio, and expects to have exchanges at some of the points now controlled by the Bell Company in the near future. All the exchanges controlled by the Fayette Company are connected with metallic toll lines.

INDEPENDENT EXCHANGE FOR CROOKSVILLE, OHIO.

CROOKSVILLE, Ohio, is to have an Independent telephone exchange. Recently the Crooksville Telephone Co. was incorporated at Columbus, for $10,000 by J. B. Rhodes, J. C. Moore, Thomas F. Wilson, Will Harris and S. M. Winn, for the purpose of establishing an exchange as an adjunct to the Zanesville Telephone & Telegraph Co., with United States and Independent connections, and all points that these lines reach. Several weeks ago Manager Rhodes of the Zanesville Company, established a toll station at Crooksville, connecting with the city and the outer world via Roseville and Zanesville.

Manager J. B. Rhodes, of the Zanesville company, said: "We expect to have the exchange in operation by January 1 and will put a corps of solicitors in the field immediately. After the exchange is established we will extend into the surrounding country, giving a rural service such as we maintain here, at Roseville and at Dresden, and create a toll service direct to New Lexington and from that point to Lancaster. From Lancaster we can get Columbus direct, thus establishing a direct wire from Zanesville to the Capital City.

THE TELEPHONE CENSUS.

A PERMANENT bureau of statistics has been established by the United States census department since July, 1902, and is securing, taking one at a time, the statistics on some one industry. The department has just completed its work on mines and the mining industry and is now at work on telephones.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

DUTY TO ESTABLISH GUARD WIRES.

ONE of our wires fell and came in contact with the trolley wire of an electric railway company underneath. It thus became charged with a heavy current of electricity and a horse that ran against it was badly burned. The common council had ordered the street railway company to put up a guard wire but it had not done it. Does that not make the railway company responsible for the injury and not ourselves? If they had put up the guard wire the accident would not have happened. F. P. M.

ALTHOUGH at first glance the accident appears to have been primarily the fault of the street railway company, such is really not the case. Both companies would undoubtedly be liable as joint wrong doers. Your company knew the danger of contact by the wires falling as well as the street railway company, and, while the latter was negligent in not obeying the council's order, you were negligent in not taking precautions to prevent what you knew was likely to occur if one of your wires fell. McKay v. Southern Bell Telephone Company, 31 L. R. A., 423. United Electric Ry. Co. v. Shelton, 89 Tenn., 423. The only safe course for a telephone company to follow is to put up guard wires itself if the other electric company neglects to do so. The telephone company should even go the length of compelling action by the other company by legal proceedings, if the latter is violating an ordinance or plain duty by refusing.

SOME QUESTIONS OF EVIDENCE.

IN an action for damages against a Kansas telephone company for injuries resulting from alleged negligence in laying two telephone poles beside the side of the highway in such a way as to frighten horses, the opinions of witnesses were offered and received to show that the poles presented such an appearance that horses were likely to be frightened thereby. Two objections were made against the admission of the testimony: First, that the subject was not such as to justify expert testimony, and second, if it had been, the inquiry should have been limited to such horses as are gentle and roadworthy. The court held that expert testimony was not admissible and that the inquiry was not properly limited. Objection was made to the reception of testimony of an opening statement made by counsel for the company on a former trial of the case. In the statement was an admission of a material fact as to the action of the telephone company in the premises. The admission appeared from the record to have been distinctly and formally made. The court held that the testimony was properly admissible. The error of admitting the opinion evidence caused the Supreme Court of Kansas, where the case was tried, to order a reversal of the judgment that had been entered against the telephone company. Missouri & Kansas Telephone Company v. Vandevort, 14 Am. Neg. R. 291.

RAISING WIRES FOR PASSAGE OF HOUSE.

COL. C. H. GRAVES, president of the Duluth Telephone Company, was recently arrested and arraigned in the municipal court, charged with a violation of the city ordinance which provides that telephone, telegraph and electric companies shall raise or lower their wires for the passage of a house in the course of removal when requested to do so by the council. A resolution had been passed by the council asking the company to raise its wires for the passage of an old fire hall that had been sold by the city to a private person. When the latter asked the company to comply with the resolution, the company asked him to pay $25 to cover the expense of the work. He paid under protest and the work was done. The prosecution was instituted in pursuance of a resolution of the common council. The ordinance provides that on conviction a fine of not more than $100 or imprisonment for not more than ninety days may be imposed. The company's attorney demurred to the complaint, but the demurrer was overruled. A plea of not guilty was then entered and the case set for trial.

FRANCHISE A CONTRACT WITHOUT CONSIDERATION.

IN a suit against the Home Telephone Company of Ohio for injunction to prevent it from raising its rates and to compel it to furnish service at the rate provided for in its franchise, the company has succeeded in obtaining judgment. A statute of the state provides that telephone companies shall have the right to occupy public ways for the purpose of erecting their lines. The court held that by this statute the company had the right to enter the city without a franchise and that the franchise, being unnecessary, was not supported by consideration, and therefore did not amount to a contract. The city was therefore not in position to enforce the terms of the franchise and could not hold the company to the rate provided. The court also said that the city had no such "beneficial interest" in the matter as to make the right of entry into the city a subject of sale or to supply a consideration for the agreement as to rates. Macklin v. Home Telephone Co., 24 Ohio Cir. Ct. R., 446.

RIGHT OF CITY TO REQUIRE CONDUITS.

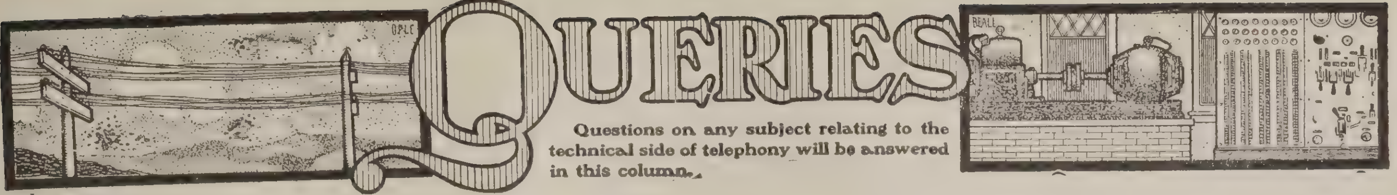
THE Bell Telephone Company has been granted an injunction prohibiting the city of Rochester from cutting down the poles of the company on Buckingham street. The questions that are in dispute are the right of the city to force the telephone company to build underground conduits for carrying their wires from the curb to the houses, and the city's right to compel all the companies to string their wires along one line of poles. It is also intended to require the companies to secure a permit from the Commissioner of Public Safety before starting construction work.

INJUNCTION ISSUED IN TWENTY MINUTES.

A TEMPORARY restraining order has been issued against the manager of the Home Telephone Company, an Independent company now installing a plant in the city of Beatrice, Neb. The effect of the order was to restrain the company from putting in a telephone pole in front of a hotel in that city. When it became known that the new company intended to set poles in front of the hotel, the proprietor quickly secured the services of a lawyer who drew up an application for a restraining order and sent for the county judge. The order was granted and served before the pole was put in position, less than twenty minutes after the application was made.

GOOD LAWYER WANTED.

JUDGE TULEY, of Chicago, has granted an order referring the claims against the Chicago Telephone Company, aggregating, it is said, several millions of dollars, to a master in chancery. There are 1,200 complainants, who are entitled, according to a decision of the Illinois Appellate Court, to recover all they have paid the company in excess of the franchise rate of $125 per year, and it will take a master in chancery a year to hear the proofs.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

BATTERY INTERNAL RESISTANCE.—(243.)

How do you find the internal resistance of a battery? M. S. B.

The accompanying illustration (Fig. 243) shows one good method of determining the internal resistance of a battery. In this illustration *B* is the battery, whose resistance is to be determined, which is connected to a galvanometer *G*, through a condenser *C*, and a key *K2*. Around the battery there is a shunt *S* and another key *K1*. The operation of measuring the battery resistance is as follows: The condenser is short-circuited for a moment to see that it is completely discharged. Then the key *K2* is pressed and kept permanently down. At the time the circuit is closed there is a rush of current from the battery, through the galvanometer to charge the condenser, and the deflection produced on the galvanometer should be noted and designated say, by *A*. The key *K1* is then pressed and another deflection is obtained on the galvanometer. Let this deflection be called B. Suppose R to be the resistance of the battery, and S the resistance of the shunt. Then it can be shown that $R = S \frac{B}{A - B}$. For example, suppose the shunt *S* has a resistance of 10 ohms. The deflection upon pressing the key *K2* to be 310 divisions, A, and the deflection when *K1* is pressed to be 100 divisions in the reverse direction, or B. Then

$$R = 10 \frac{100}{310 - 100} - 310 = 4.76 \text{ ohms.}$$

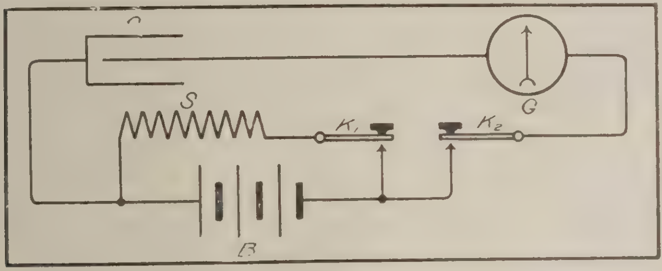


Fig. 243.

CONNECTING A NOISY LINE TO A QUIET ONE.—(244.)

If a noisy grounded line be connected to an otherwise quiet metallic line by means of a repeating coil, will the metallic line become noisy? The drawing (Fig. 244) shows what I mean. W. O. B.

It is impossible to answer this query absolutely. A repeating coil is introduced between a metallic line and a grounded line in order to prevent the metallic line from becoming noisy. Noise upon a grounded line is usually caused by a certain amount of current flowing over the line. The coil prevents this current from having direct ingress to the metallic, but there remains the inductive effect of the repeating coil. If the grounded line is not very noisy the metallic line will usually be quiet. But on the other hand, cases may arise which will make the grounded line so noisy that the inductance of the repeating coil is insufficient to make the metallic line quiet.

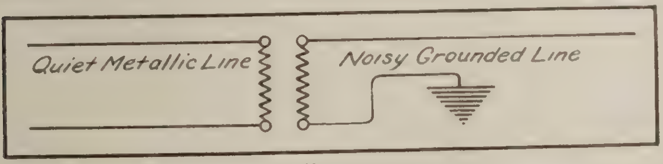


Fig. 244.

A COMBINATION KEY.—(245.)

Will you give me a diagram of a key that I can ring with while the key is in the listening position? The object sought is to use only the one position of the key and also one that will automatically cut out the answering cord and the operator's set while ringing with the front or calling cord. A. U. F.

We do not understand what is meant by your query, for it seems to us impractical to arrange any circuit so that one can ring in the listening position and at the same time cut off the operator's telephone from the circuit, for this is the way in which we understand your query. What we suppose you mean, however, is a circuit arranged something as in the accompanying illustration (Fig. 245). *A* is the answering and *C* the connecting plug, *G* the generator, and *O* the operator's testing set. There is a key which consists of six springs *a, b, c, d, e,* and *f*. The springs *a* and *b* normally connect the tips of the plugs, while the springs *c* and *d* connect the sleeves of the plugs. By pressing the springs *a* and *c* the line is opened towards the connecting plug and connected to the generator, thus the operator can ring upon the answering plug in the listening position. By means of the springs *e* and *f* the operator's set is bridged across the line. The springs *b* and *d* can be omitted, and often are, making a four-spring key.

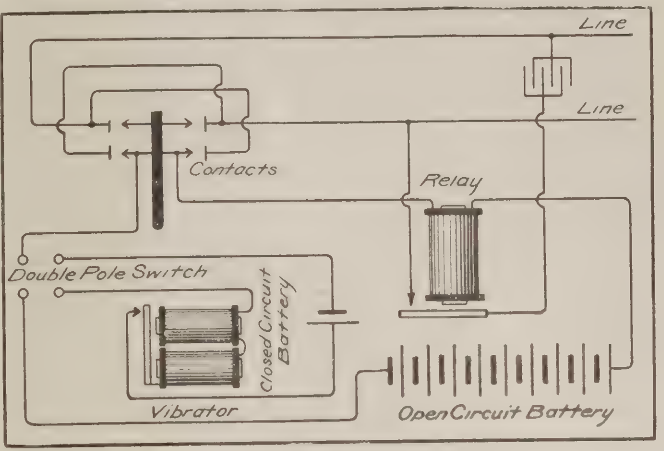


Fig. 246.

A POLE CHANGER QUESTION.—(246.)

In the article in your paper describing a pole-changer I notice that the condenser is bridged across the line by means of a relay. Why is the condenser not left connected across the line all of the time? C. A. M.

The object of connecting the condenser across the ringing leads from a pole changer to the switchboard by means of a relay, is to insure the flow of current from the batteries only during the time that an operator at the switchboard is using the current for signalling purposes. From an inspection of the accompanying wiring diagram (Fig. 246), of a pole changer, it will be seen that when the circuit is closed from the pole changer through an instrument connected to the switchboard, the relay is operated and the condenser connected across the ringing leads, the condenser being so connected only during the time that current is flowing to the called station. If this were not the case and the condenser was permanently bridged across the line, the alternating current from the pole changer would readily pass through it and it would thus act as a short circuit across the battery leads, and would very quickly destroy the power of the battery. The relay is so adjusted that the current which passes through the condenser alone will not operate it.

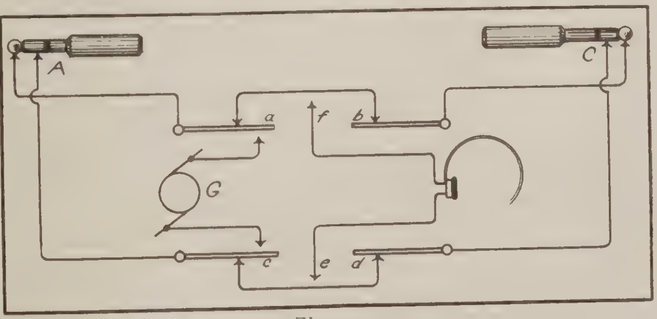


Fig. 245.

PATENTS ISSUED

ELECTRIC CUT-OUT.

Lewis W. Miller, of Rochester, New York, patents (No. 743,540) an electric cut-out and assigns his invention to the Alert Manufacturing Company, of Rochester, New York. This cut-out is designed to prevent injury to electrical apparatus due to the flow of excessive currents. Fig. 1, shows a plan view of the cut-out, Fig. 2, a front elevation and Fig. 5, a connection diagram. The line wires are represented by *M*. The construction of the cut-out is such that the flow of an excessive current causes the armature *C*, to be attracted and this through a lever connection raises the block *D*, opens the line wire and cuts out the instrument, the dangerous current being allowed to flow through the magnet coils. The magnets are wound with two windings, the outer winding being of large wire and adapted to carry a heavy current without becoming unduly heated. The operation of the cut-out causes the excessive current to flow through the outer winding of the magnets.

Fig. 1.

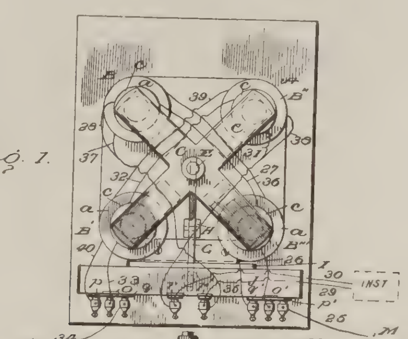


Fig. 2

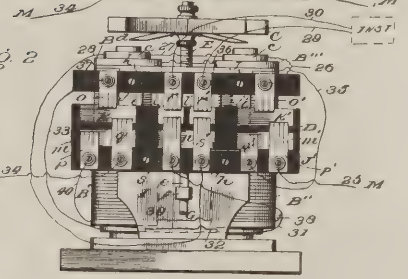
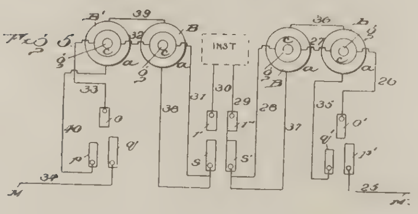
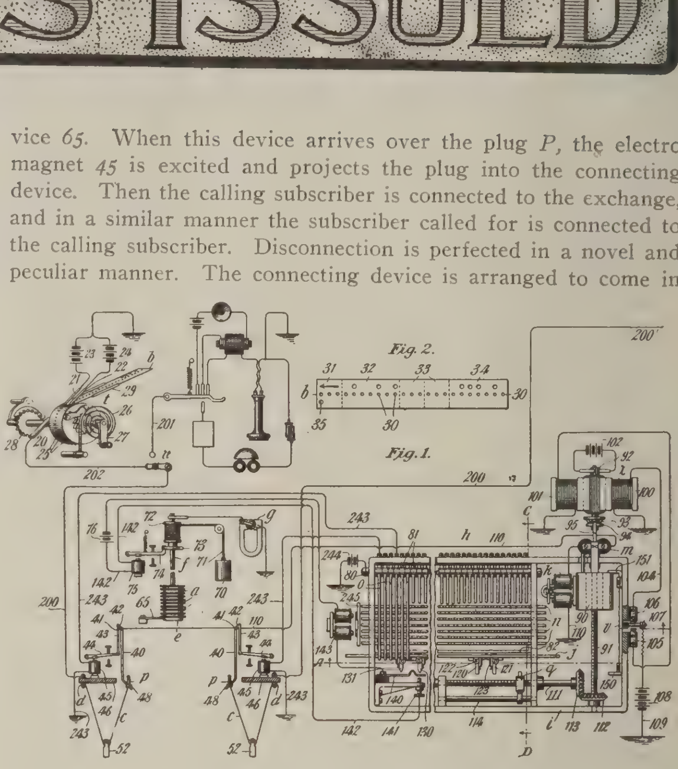


Fig. 5



AN AUTOMATIC TELEPHONE EXCHANGE.

Wm. B. Vansize, of New York, patents (No. 744,946) an automatic telephone exchange. This is a voluminous and complicated patent, requiring ten drawings and four sheets of illustrations, together with eight pages of specifications. It is too complicated to abstract, excepting in a very brief manner. The general outline of the apparatus is shown in Figs. 1 and 2. Each sub-station is furnished with a perforated tape which passes over a metallic roller connected with the line. A pair of contact springs and battery send impulses through the line according to the perforations in the paper. These impulses operate the selective mechanism which resembles in some respects that of the Stroger system. The present patent, however, is unique in the method of connecting two lines together. A plug *48* is connected with an electro magnet *45*. The selecting arrangement carries a portable connecting device *65*. When this device arrives over the plug *P*, the electro magnet *45* is excited and projects the plug into the connecting device. Then the calling subscriber is connected to the exchange, and in a similar manner the subscriber called for is connected to the calling subscriber. Disconnection is perfected in a novel and peculiar manner. The connecting device is arranged to come in contact with a heated insulated surface. The connecting device contains a fusible section that when heated gradually melts. Then the shell releases the plug terminals and the take up device returns to its normal position. The interval required for the release of the terminals is the period of time assigned to conversation. Those who are interested in this patent would do well to procure a copy thereof.



TELEPHONE SWITCHBOARD.

Charles S. Exley, of Clark County, Iowa, patents (No. 744,735) an improved telephone switchboard. This patent is illustrated in Figs. 1, 2, 3 and 4. Fig. 1 is an elevation, Fig. 2 a section, Fig. 3 a diagram of the circuit, and Fig. 4 a detail of the plug.

Fig. 1.

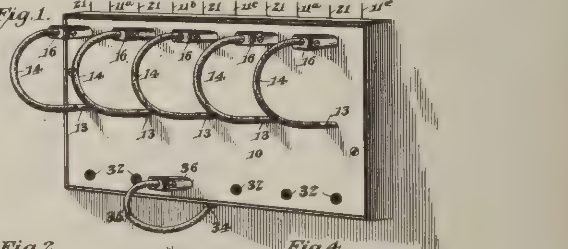
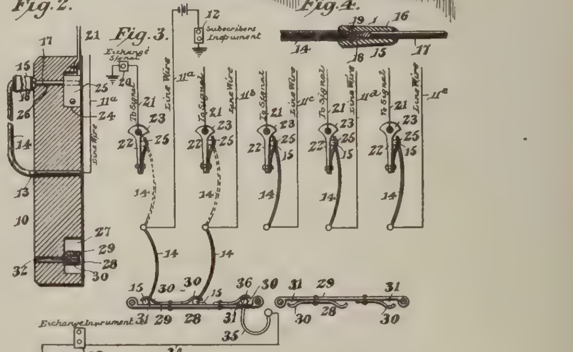


Fig. 2. Fig. 3. Fig. 4.



There is a base plate *10* carrying a series of binding posts *13*, to each of which a subscriber's station is attached, as shown in Fig. 3, in which *12* is the station, *11a* the line wire, and *20* any form of signal. It will be noticed from the circuit that each subscriber's line terminates in the plug *13*. When a subscriber signals the exchange, signal *20* is operated. The operator then plugs into a jack *22*, and ascertains what line the subscriber wants. The operator then inserts the plug *16* into the jack of the subscriber called for, and signals in the usual manner.

SYSTEM OF TELEPHONIC COMMUNICATION.

James Tarbotton Armstrong and Axel Orling, of London, England, patent (No. 744,001) a system of telephonic communication. Fig. 1 shows the arrangement of the transmitting circuit and Fig. 3 the receiving circuit. The varying resistance of the transmitter *dx* causes a fluctuating current to pass through the inductance coil *c*, thus inducing extra currents which flow to earth. As the resistance of the transmitter is increased a larger proportion of the battery current flows to earth as well as the extra induced currents of high potential. The currents thus lead to earth set up lines of flow which extend to considerable distances, and are intercepted by the earth connections at the receiving stations which constitute shunt circuits to the main path.

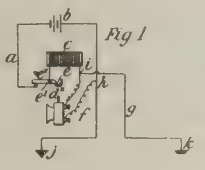


Fig 1

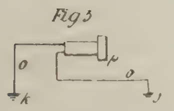


Fig 3

TELEPHONIC RAILWAY SIGNAL SYSTEM.

John Whyte and Gordon C. Edwards, of Toronto, Canada, patent (No. 744,655) an improved method of railway signaling by means of the telephone. The object of this invention is to provide a device so that the engineer of a running train may be signalled from any point upon the line, or that the engineer may signal any station. This invention is shown in Figs. 1, 2 and 3. The inventors provide a main circuit *C*, Fig. 1. This is connected to a number of shunt circuits *D*. The locomotive is provided with a contact *H* that bears upon the shunt circuit. This is connected with the signal of a telephone situated in the cab that is shown in detail in Fig. 3. The operation is as follows: If a current is transmitted through the main circuit *C*, it affects all of the shunt circuits. If the contact *H* bears upon any shunt circuit the instrument in the cab is affected and the signal *17* is displayed. Upon seeing this signal the engineer knows that some one is calling him, and by the switch *15* he can cut a telephone into service and find out what is desired. Conversely, the engineer can at any time transmit a current through the shunt circuit and display the signals at any station, *A* or *A* .

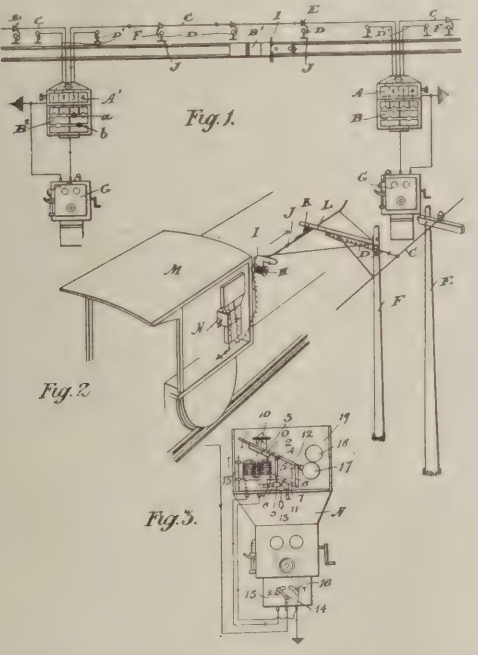


Fig. 1. Fig. 2. Fig. 3.

IMPROVED LIGHTNING ARRESTER.

Wm. L. Ralston, of Westchester, Iowa, patents (No. 744,103) an improved lightning arrester. This is a device to render protection from lightning more certain and secure. It is shown in the figure.

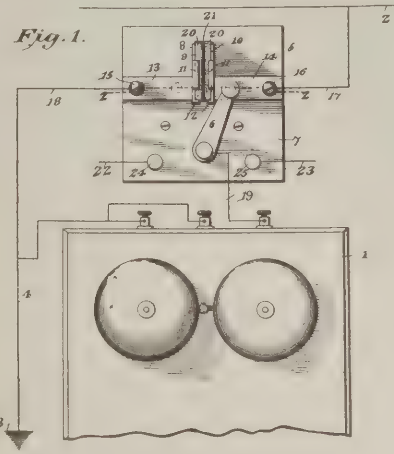


Fig. 1.

There is a base *7* upon which two metal plates *13* and *14* are placed. These plates carry spring clips *8*, in which two carbon blocks *20* are placed, separated by a slip of mica, *21*. This forms the ordinary carbon lightning arrester. In addition the base is provided with a switch *6* which is connected to one binding post of the telephone, *19*. Under ordinary circumstances the switch makes contact with the plate *14*, and this connects the telephone to the line. In case of a thunder storm the switch may be swung to one side of the circuit which leaves the lightning arrester in operating condition, but cuts out the telephone set.

IMPROVED HEAT COIL.

Otto Hoffman, of Chicago, Ill., patents (No. 744,197) and assigns to Fred Greer, of Chicago, Ill., an improved heat coil. The object of the invention is to provide a heat coil which is simple and inexpensive to construct and may be readily and easily repaired. This invention is shown in Figs. 1, 2 and 6. The inventor provides an insulating case *1* upon which the terminal ends *2* and *3* are affixed. These terminals, as is shown in Fig. 6, hold the heat coil between the two springs *19* and *20*, which tend to separate from each other. In the center of the coil is a carbon rod *9* which rests against a spring *10* at one end, and in a socket *12* at the other end. There are two springs *16* and *16*. These springs are attached to the terminals *7* by means of fusible solder. The circuit passes through the carbon rod *9* and the springs *14*. If the current is abnormal, the carbon rod becomes heated, melts the solder *17*, and the tension of the springs *19* and *20*, causes the springs *16* to fly out of the socket into which they are inserted. The heat coil may be immediately repaired by replacing the springs and soldering them by the heat of a match.

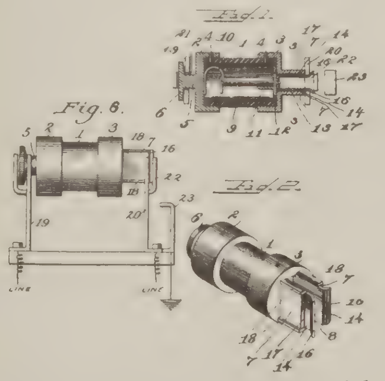


Fig. 1. Fig. 6. Fig. 2.

The Week's Messages.

FINANCIAL

CONCORD, ILL.—The Home Telephone Company, of Concord, has increased its capital stock from $10,000 to $16,000.

DECATUR, ILL.—The property of the Citizens' Mutual Telephone Company will, it is announced, be sold on March 22d under a chattel mortgage by the trustee, J. M. Dodd. The outstanding bond amounts to $20,000, of which the interest nas been defaulted ror a year. The company has 600 subscribers, and a valuable plant and franchise.

RIVERHEAD, L. I., N. Y.—The Bating Hollow and Roanoke Telephone Company will have a special meeting at Bating Hollow on December 8th to vote on increasing the capital stock from $5,000 to $20,000.

NICOLLET, MINN.—The Nicollet County Telephone Company has increased its capital stock from $20,000 to $50,000.

BELTON, TEX.—The Bell County Telephone Company has filed a mortgage in favor of the Columbus Savings and Trust Company covering all the company's property in Bell County.

FRANCHISES

COLORADO SPRINGS, COL.—The Automatic Telephone Company, which was denied a franchise by the city council last spring, will, it is reported, renew its efforts to establish an Independent system in this city.

GRIMES, IA.—The Farmers' Mutual Telephone Company is preparing to construct a line from here to Valley Junction, and has asked for a franchise at the latter place.

STEELE, N. D.—The city council has taken preliminary steps to grant a telephone franchise to Mrs. A. Allshouse, who is desirous of constructing a local exchange with connections to Jamestown and Bismarck.

MIDDLETOWN, PA.—The Cumberland Valley Telephone Company has been granted a franchise by the city council.

HILLSBORO, TEX.—The Commissioner's Court has granted a franchise to J. R. Thaxton for the construction of a telephone exchange at Malone, a new town at the intersection of Trinity and Brazos Valley, and International and Great Northern Railroads.

COMBINATIONS

MINK COVE, N. S., CAN.—Sam Sidney, of Mink Cove, has purchased the entire stock of the Westport and Digby Telephone Company.

PANA, ILL.—A company, by local capitalists, Warren Penwell, C. T. Penwell and Ben Beckenheimer, has purchased a controlling interest in the Pana and Christian County Telephone Company.

WEST BRANCH, IA.—E. C. Ball has sold his interest in the West Branch Telephone Company to J. S. Fawcett and C. H. Fairall. It is the intention of the new management to extend the system which now pretty well covers the entire territory.

LAKE CITY, MICH.—The Swaverly Telephone Company, of Kalkaska, has sold its toll lines in Missaukee County to Missaukee County people, who trade their stock in the Swaverly Company for these lines. The lines will be operated by the Lake City exchange, with George S. Stout as manager. Many improvements are under consideration.

PERE MARQUETTE, MICH.—The Pere Marquette Telephone Company and the Oceana Telephone Company have been combined. The Oceana company has 700 subscribers, and the Pere Marquette company 500 subscribers. The re-organized company will make extensive improvements at once.

NORTH BROOKFIELD, N. Y.—J. M. Angell has purchased a telephone line running from Stockville to North Brookfield.

WEST MILTON, OHIO.—The Milton Telephone Company has purchased the Gordon and West Baltimore lines.

ABERDEEN, S. D.—The Dakota Central Telephone Company has purchased from Richard Yearneau the Clarke Telephone System.

BARABOO, WIS.—Mr. J. A. Murray, who established a telephone system in North Freedom, has sold his system to the Baraboo Telephone Company, in which he has taken stock. He will remain in North Freedom as manager of that office.

SHELL LAKE, WIS.—The Minneasota Mutual Telephone and Telegraph Company has arranged to lease the Clam Lake Telephone line from Andrew Ryan.

ELECTIONS

OSWEGO, N. Y.—The officers of the Ontario County Telephone Company of this place are: F. A. Emerick, president; Niel Gray, Jr., vice-president; E. B. Powell, secretary, and R. A. Downey, treasurer. In the issue of November 7th a list of officers of this company was given, which was incorrect. This second insertion is to correct the error.

PORT JEFFERSON, N. Y.—At a meeting of the North Shore Telephone Company held Saturday, November 28th, at Port Jefferson, the following officers were elected: President, J. H. Davis, Port Jefferson; Vice-President, Frank Tuthill, Rocky Point; Secretary, C. V. Platt, Port Jefferson; Treasurer, C. A. Squires, Echo. The North Shore Telephone Company was organized, and will be managed by M. E. Overton, a young telephone engineer. Arrangements are under way whereby the several Independent companies operating are to be connected, thus giving Independent connections to almost every part of the island.

STEUBENVILLE, OHIO.—The Island Creek Telephone Company completed its organization recently by the election of the following officers: W. L. Ford, E. Y. Powell, D. S. Carr, W. E. Abraham, C. W. McCullough, F. C. Shane and J. H. McCullough

SCALP LEVEL, PA—The Salix Telephone Company held its meeting here recently and elected the following officers: R. D. Schafer, of Paint Township, president; J. B. Statler, of Scalp Level, secretary and treasurer; Dr. W. L. Helsel, A. Hoffman, Lewis Hostettler and J. B. Statler, of Scalp Level; R. D. Schafer, of Paint Township; M. P. Boyle, W. R. Foster, Harry Levank and Charles R. Glock, of Johnston.

SALEM, S. D.—The Salem Telephone Company has elected the following officers: J. F. Schneider, president; L. S. Tyler, vice-president; D. Goldsmith, treasurer, and S. M. Gilbert, secretary. The other members of the Board of Directors are I. J. Todd, W. A. Nye and C. M. Searles, who is manager. The company is considering the construction of a line to Ramsey by way of Center.

ORANGE, VA.—The Orange Telephone Company has declared a dividend of 6 per cent., and elected the following officers: George S. Shackleford, president; W. F. Coats, secretary and treasurer; Dr. W. J. Crittenden, manager, and E. D. Cole, director.

PERSONAL

FRANK W. BUFFUM, manager of the Buffum Telephone Company, was in Fulton recently investigating the situation and estimating the cost of material. The Buffum Telephone Company is connected with all the leading cities in the neighboring counties, and also many counties in Illinois.

CHARLES F. CUTLER has been elected president of the Hudson River Telephone Company, to succeed James H. Manning, of Albany, resigned. Mr. Cutler is also president of the New York Telephone Company, and the New York and New Jersey Telephone Company.

W. W. DEAN is now chief engineer of the Kellogg Switchboard and Supply Company, of Chicago, and is in full charge of the laboratory and all exchange work.

SENATOR FAIRBANKS has returned to Indianapolis, Ind., from Washington, and states that he is preparing to reinstate in Congress his bill providing for rural telephone mail delivery. He says he had a conference with Postmaster-General Payne, who expressed himself in hearty accord with the project. When a letter bearing a special stamp arrives at a country post office, the postmaster will open it and telephone the contents to the person for whom it is intended. The stamps will be issued in series varying with the number of words in letter to be telephoned.

THE WEEK'S MESSAGES—Concluded.

CAPEL HOLLAND has resigned as president and general manager of the People's Telephone Company, Morgantown, W. Va.

N. H. HOLLAND, the well known telephone engineer, has resigned from Couch & Seeley Company, and is now with the Holtzer-Cabot Electric Company, at the Brookline factory.

FRANK C. McCONNELL, of Youngstown, has been appointed manager of the Northern Ohio district of the Central Union Telephone Company, with headquarters in Akron. Mr. McConnell took up his new duties December 1st. He is well and favorably known in telephone circles, having had a wide experience in the business. Akron will be the headquarters of the district which will extend from Mansfield on the south to Norwalk on the west, the eastern and northern limits being the State line and Lake Erie respectively.

H. PATTON, general superintendent of the United States Telephone Company, of Waterloo, Ia., has gone East on a business trip in the interest of the company.

M. H. SPERE, of Wray, Col., manager of The Wray Telephone Company, has just returned from Washington County, where he organized a telephone company which was capitalized for $25,000. Part of the construction material is now on the ground. The Wray Telephone Company is capitalized for $50,000.

J. C. THORNTON, who is superintendent of the construction for the Buffum Telephone Company, was in Fulton, Mo., recently for the purpose of making preparations for improvements of the company's lines. Also to make some improvements in the central office at this place. This company has lately been connected to the Kinloch long distance telephone company.

UNDERGROUND

MANKATO, MINN.—Manager Buchholtz and General Superintendent J. W. Christie, of the Northwestern Telephone Exchange Company, have petitioned the council to grant the company permission to lay its wires underground along a portion of Front street.

DUBUQUE, IA.—The city council of Dubuque has adopted the ordinance regulating the placing of telephone wires underground. This gives the Iowa Telephone Company the right to place its wires underground.

JERSEY CITY, N. J.—The Street and Water Board has taken steps to secure legislation that will enable the city to put all electric wires underground.

SPOKANE, WASH.—The Pacific States Telephone Company is preparing to put its wires underground along another mile of its system.

MISCELLANEOUS

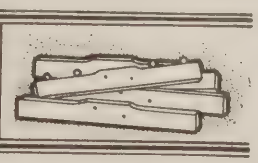
MUNCIE, IND.—The Muncie operators of the Delaware and Madison Counties Telephone Company gave a ball the night of November 19th, inviting the operators from Richmond, Portland, Ridgeville, Fort Wayne, Bluffton, Hartford City, Alexandria, Anderson, Winchester, Marion and other gas belt cities. After the programme of dances a banquet was served by the officers of the company. Flowers were distributed as souvenirs.

LOUISVILLE, KY.—A meeting was recently held here by the auditors of the Louisville, Kansas City and Toledo Home Telephone Companies to discuss and establish a uniform system of accounting. Those present were C. L. Archer, of Louisville, Ky.; H. A. Lehrs, of Kansas City, Mo., and H. B. Taylor, of Toledo, Ohio, auditors of the above companies.

UTICA, N .Y.—The Utica Home Telephone Company has increased the number of directors from seven to nine. Among them are Ed. L. Barber and Charles H. Poole.

UNIONTOWN, PA.—The Tri-State Telephone Company now has direct connections with all parts of Green County, and with West Virginia towns through connection with the South Penn Telephone Company.

New Construction in the Field



FELIX, ALA.—Messrs. Suttle, Jones and Gilmer, of this place, are the prime movers in a plan to construct a telephone line to connect Selma, Felix and other points. The stock is being subscribed by people living along the proposed line.

STERLING, ILL.—The Interstate Telephone Company has completed connections with the Albany Telephone Company in the western part of the county through a double metallic circuit pole line from this city to Albany.

BROWNSTOWN, IND.—The Brownstown Telephone Company is reconstructing its line from Brownstown to Kurtz.

WATERLOO, IA.—The La Porte City Telephone Company held a meeting recently, and prepared plans for the improvement of the system in La Porte, and to give better connections between La Porte and Waterloo.

WELLINGTON, KAN.—The Farmers' Mutual Telephone Company, of Rome, has been granted a franchise to construct a telephone line in this city. The company is desirous of connecting with the exchange of the Independent Telephone Company.

UPTON, MASS.—George Z. Williams is arranging to construct a telephone line from Upton to Christian Hill.

MANKATO, MINN.—The Board of Directors of the Minnesota Valley Telephone and Telegraph Company held a meeting in this city recently, and elected W. S. Haskell, superintendent of the company. The extension of the line which is now in active operation from here to Medalia, and work on the line to St. James and Windom is also being pushed.

CARLTON, MO.—The Citizens' Telephone Company, of North Missouri, have lately ordered a new switchboard, poles, wires, etc. The new board will be installed soon.

HANNIBAL, MO.—The cable which will connect the Illinois lines and the Pike County Telephone Company with the Missouri lines of the Bluff City Telephone Company, has been laid across the Mississippi River here. The cable is over 3,000 feet long.

LOUISIANA, MO.—The Buffum Telephone Company of this city announces the completion of its new copper long distance line to St. Louis, connecting with the Kinloch system.

ST. LOUIS, MO.—The Kinloch Telephone Company has lately connected Canton, Mo., with St. Louis, by a new copper metallic line. The distance is about one hundred miles.

DAKOTA CITY, NEB.—The Clarke Automatic Telephone Company, of Sioux City, is building a rural telephone line to run from this town, covering a distance of about thirty miles.

VESTA, NEB.—The Crab Orchard Telephone Company is setting poles to connect Vesta and vicinity with the Crab Orchard exchange.

FLEMINGTON, N. J.—The Merchants and Farmers' Telephone Company has secured the right of way, and will construct a line to Three Bridges.

BURDETT, N. Y.—The Century Telephone Company is stringing wires on the poles set last year. Its new line will complete the circuit between Elmira, Corning and Ithaca.

CORTLAND, N. Y.—The Home Telephone Company is now connected with the Dryden exchange, which gives connections with Virgil and Hartford.

JONESVILLE, N. Y.—Del. Van Hyning has completed a telephone line from here to Round Lake, and will construct another one to Ballston Lake and Burnt Hills.

MANCHESTER, N. Y.—The Red Jacket Telephone Company, known as Osgood's Independent Telephone System, before its incorporation, is extending its lines through the village of Farmington, using the poles of the Inter-Ocean Telephone Company, of Buffalo.

NEW YORK, N. Y.—Mexican advices state that Henry Lavelt, who represented a syndicate of Ohio capitalists, is in Durango where his principles are to build an extensive telephone system. It is also planned to construct long distance telephone systems on the Pacific coast of Mexico.

ROCHESTER, N. Y.—The Rochester Telephone Company has made application for permission to set 200 additional poles.

BISMARCK, N. D.—The Bismarck Telephone and Electric Company expects to put several thousand feet of new cable in place in a short time.

JEFFERSON, OHIO.—The Jefferson and Warren Telephone Company is preparing to establish a telephone exchange at Bristolville.

MANSFIELD, OHIO.—The Mansfield Telephone Company has been awarded the contract for constructing a telephone system in public schools.

NORTH LIMA, OHIO.—P. W. Sprinkell, vice-president of the Beaver Telephone Company, announces that the company will extend its system to New Springfield.

MONROE, S. D.—Work has been commenced on the construction of a local telephone system. A rural line will be constructed this winter to connect with the Parker system.

TOLEDO, OHIO.—The Wabash Railroad has substituted the telephone for the telegraph in handling a great part of its business. The road from Toledo to St. Louis has been wired and will be ready for operation in a short time.

URBANA, OHIO.—The Independent Telephone Company is making extensive improvements in its plant in this city.

KNOXDALE, PA.—D. P. Bell expects to take subscriptions for the construction of a telephone line from Knoxdale to Panic, and to Reynoldsville.

TRADE NOTES

The C. McIntire Company, of Nos. 13 and 15 Franklin street, Newark, N. J., announces that it is furnishing Independent telephone companies with its connectors for both copper and iron wires in all standard sizes; also branch or split combination connectors.

The Tengwall File and Ledger Company, of Ravenswood Station, Chicago, Ill., has evolved the Columbia Screw-Lock Ledger, which is the result of long years of loose-leaf ledger experience, and is made by practical loose-leaf experts. The company claims it cannot afford to add to its long list of well-known loose-leaf specialties a ledger that is not a step in advance of anything on the market and that its Columbia ledger fills the bill.

The American Conduit Company, of 170 Broadway, New York City, 822 Manhattan Building, Chicago, and 336 Macy street, Los Angeles, Cal., will have a very interesting exhibit of its product Bituminized Fiber Conduit, in the Auditorium Hotel in Chicago during the Interstate Convention. Gentlemen will be in attendance who will be able to furnish any information desired concerning the conduit and will make it a point to have each visitor feel that he was glad he came. It will be an excellent chance to learn about conduit work, and all interested are invited to take advantage of it.

The F. Bissell Company, of Toledo, Ohio, has taken rooms at the Auditorium Hotel, Chicago, where it will be at home during the Interstate convention, December 8th, 9th, 10th and 11th. This company has issued another leaflet which describes and prices many telephone specialties. Brass telephone signs enameled in proper colors are given a prominent place on the leaflet's cover. These are made both flat to be screwed to a surface and round to be attached to a corner. Another novel device is a switch to be used in connection with a switchboard portable hand lamp. When the lamp is hung on its hook it is extinguished and when it is removed it is lighted.

The Attica Foundry & Machine Company, of Attica, Ohio, is putting on the market the Blaine Land Anchors. This anchor, the makers claim, is different from others now in use in that it is ready to take its strain immediately after setting, whereas other types require a strong pull and time to settle them. In using this anchor a hole a foot square is dug into the ground and the anchor rod driven from the surface, at an angle to the bottom of the hole, at which point the anchor plate is slipped over the rod where it automatically locks. The rod as it bears against solid earth is then ready for the strain. As far as the holding power of the guy is concerned, it is not necessary to fill up the hole. The company will be pleased to send descriptive matter on application.

J. W. O'Brien & Company, of the Journal Building, Boston, Mass., is a new concern that undertakes conduit engineering propositions. It is prepared to install complete underground installations of conduit and cable using any system for either telephone, street railway, or electric light purposes. The Edison Solid System receives special attention. Mr. J. W. O'Brien has been in the business for sixteen years and has worked the country over from Maine to California during which time he has been connected with the Edison General Electric Company, The General Electric Company and the Northeastern Telephone & Telegraph Company, and has during the period been intimately associated with the underground work done by these companies. Mr. D. S. Ryan, another member of the firm, was for a number of years connected with the construction department of the Northeastern Telephone & Telegraph Company. The company intends to make a specialty of catering to the New England field.

FOR SALE

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

FOR SALE OR ROYALTY—United States and Canadian patent on telephone and telegraph device. No *competition whatever.* A winner. Investigation asked. Address Box 114, The American Telephone Journal, 116 Nassau St., New York City. 114

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOU USE THEM EVERY DAY.—Toll Tickets for Independent Companies. Five thousand, 3 colors, prepaid, $2.50, cash with order. The American Telephone Journal knows we are O. K. Write for samples; also figures on large quantities. GILDART BROS., Albion, Mich. 112

POSITION wanted with reliable telephone company as manager or superintendent. Ten years' practical experience in telephone work. If your plant is not paying dividends, let me hear from you. Can furnish best of references. North or south preferred, but am willing to go to any part company desires. Address, Box 108, The American Telephone Journal, 116 Nassau St., New York City. 108.

POSITION.—A first-class construction man with thirteen (13) years' experience in telephone (both Independent and Bell) and electric light work, desires connection with a telephone company in its construction department. Will be at liberty Nov. 30. Address, Box 99, The American Telephone Journal, 116 Nassau St., New York City. 99.

WANTED—All or any part of $50,000.00. WRITE TO-DAY for particulars. The BIGGEST PAYING TELEPHONE PROPOSITION of the day. OPEN for a LIMITED length of TIME only. Address, Box 107, The American Telephone Journal, 116 Nassau St., New York City. 107

GENERAL MANAGER.—Gentleman of executive ability, for number of years general manager of (Bell) Telephone Co., fifty exchanges, 25,000 subscribers and several thousand miles toll lines, will be open for engagement with an enterprising Independent company in December. Familiar with all details of construction, maintenance, operating and successful dealing with the public. Best of references as to ability. Address, Box 109, The American Telephone Journal, 116 Nassau St., New York

WANTED—Young telephone men who would like to make extra money by easy, pleasant work during spare moments. Write now for full particulars. Address, Box 111, The American Telephone Journal, 116 Nassau St., New York City. 111

TO BUY for cash, telephone exchange of 250 to 500 subscribers in Middle or Western state. Address, Box 104, care of The American Telephone Journal, 116 Nassau St., New York City. 104

MANAGER—A good, live, energetic, capable man of experience wanted to manage a large Independent telephone system in the West. Must be able to invest not less than $10,000 in the company. Address Box 102, The American Telephone Journal, No. 116 Nassau street, New York City. 102

INVESTOR wanted to furnish necessary capital for developing good paying telephone property to be managed by an experienced telephone engineer. Will accept nominal salary and equity in plants for services. Address Box 73, The American Telephone Journal, 116 Nassau St., New York City.

The American Telephone Journal

New York City, 116 Nassau Street.

Monadnock Building, Chicago.

VOLUME VIII *SATURDAY, DECEMBER 12, 1903* *NUMBER 24*

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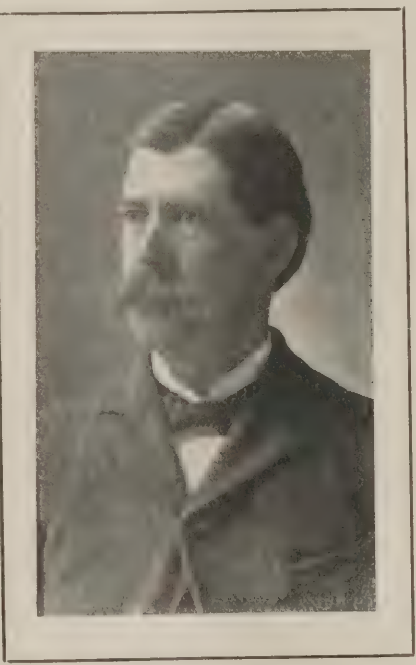
CONVENTION OF THE INTER-STATE ASSOCIATION

THE event of the week in telephone circles was the third annual convention of the Inter-State Independent Telephone Association, Dec. 8, 9 and 10. This convention was held in the Auditorium hotel in Chicago with an attendance from each of the nine states included in the territory of the association. The business sessions were held on the sixth floor of the Auditorium and a large number of rooms on the same floor were devoted to the exhibits of the various manufacturers of electric devices and telephone equipment. The convention proper did not open until two o'clock Tuesday afternoon. Tuesday morning from nine until twelve was given over to the reception of members and friends by the executive committee.

At two o'clock the convention was called to order by Hon. C. E. Hull, of Salem, Ill., president of the association. Mr. Hull introduced Frank G. Jones, of Chicago, who in turn introduced Hon. David R. Levy, who appeared as the personal representative of Mayor Carter Harrison.

Mr. Levy stated that the mayor had expected to be present and deliver the address of welcome, but was prevented from doing so by sickness in his family. He declared that Chicago was glad to welcome the association and hoped that it would continue to meet in Chicago each year. He wished to compliment the association, representing industries in nine great commonwealths, on the strides made independent of great combinations of capital. The Independent spirit represented was the one fostered by Chicago. He offered the delegates the freedom of the city and declared that should they get into trouble they could call up either the mayor or chief of police over an Independent telephone. In behalf of the mayor and citizens of Chicago he extended a cordial welcome.



HON. C. E. HULL,
Past President of the Inter-State Association.

President Hull in a brief response said that the one thing needful to secure future meetings of the association, was for Chicago's Independent company to connect with the exchanges of the association members.

E. M. Coleman, secretary of the association, moved that a committee of three be appointed to draft resolutions relative to the death of Hon. Henry C. Raney, of Iowa, who was the first president of the association. The motion was carried and the president appointed Mr. Coleman, of Kentucky, Dr. Herr, of Iowa, and L. A. Frazee, of Indiana.

President Hull then made a brief address, recommending that the constitution of the association be revised and put on a sound broad, substantial basis, with well equipped, permanent headquarters, and a press committee. He spoke particularly of the need for a press committee and its importance in fostering a favorable public sentiment. He congratulated the members upon their individual successes and assured them that whatever success the association had attained was due to the hearty co-operation of all. The address is published in full on another page of this issue.

The report of the secretary, E. M. Coleman, of Louisville, Kentucky, followed, and was delivered in the vigorous, graceful style so characteristic of that gentleman. He began by giving some interesting comparative statistics.

Mr. Coleman's Address.

In the United States the Bell people have a capitalization as follows: Subsidiary companies $373,585,609; American Telephone company stock, $131,628,200; bonds, $28,000,000, with subscribers January 1, 1903, 1,277,983. The capitalization per subscriber is $417.

The Independent companies of the country have a capitalization of in round numbers, $200,000,000, with 6,150 main exchanges and 2,000,000 subscribers. The capitalization per subscriber is $100. This takes no account of numerous rural telephone exchanges with a half million subscribers. This would bring the total number of Independent telephone subscribers up to 2,500,000.

He called attention to the fact that the association was contending against a systematic and organized foe having an overflowing treasury wrung from the public during twenty-five years of extortion. Formerly the method of this foe was to buy up local companies and thus demoralize the Independent movement. To-day the special mode of attack is to get control of the toll business and keep it, by persuading local companies into long time contracts that will keep them from becoming feeders to any future Independent line.

Another scheme, more direful than any other method, is to secretly get control of the manufacturing interests. It is a conceded fact, he said, "that one of the largest manufacturing concerns in the country is now in the control of the Bell people."

The Bell, by the use of their millions, extorted from the people, have succeeded in tempting men, both operators and manufacturers, to sell their birthrights. He suggested that the association adopt some co-operative plans to meet these conditions. Originally the territory covered by the association was limited to seven states. This had grown to nine and he thought the time had come when it should be extended to include the entire United States. He suggested that a committee be appointed to report a plan for placing the association upon a substantial and permanent financial basis. The headquarters of the association should be made the headquarters of Independent telephone operators in the United States and a general information bureau should be established to counteract the malicious publications of the enemy. He suggested further, some systematic method to protect investors in telephone securities and to give such securities a proper market value; and that the association adopt aggressive methods along business lines.

Mr. Barnhart, of Indiana, moved that a committee of three be appointed to investigate the recommendations of the secretary, outline a plan of action and report the same back to the convention at the earliest possible moment.

This motion was seconded by Dr. Herr, of Iowa, and called out some discussion. Mr. Bellamy, of Iowa, heartily endorsed the recommendations and moved as an amendment, that the committee include one member from each of the nine states represented in the convention. After some discussion both amendment and motion as amended were carried.

On motion of Mr. Rex, of Indiana, the president was made ex-officio a member of the committee to consider the seretary's report.

L. A. Frazee, of Indiana, moved that a committee be appointed to wait upon the Illinois Telephone & Telegraph company of Chicago, and ascertain its intentions relative to making connections with the Independent exchanges of the association. The motion was carried.

E. P. Cheegle, of Illinois, moved that the committee be directed to extend to President Wheeler, of the Illinois Company, an invitation to address the convention at one of its sessions and outline the plans of his company. This motion was carried.

At this juncture Prof. Goldsborough, of the department of electricity for the Louisiana Purchase Exposition, to be held at St. Louis in 1904, was given permission to address the convention. He verbally asked the association to hold its next annual convention in St. Louis, and gave the president a written invitation from the exposition management, which the president proceeded to read to the convention.

Mr. Bastin, of Kentucky, asked to have a committee appointed to select a suitable emblem of Independent telephony, copyright it and charge fifty cents for the use of it. The matter was referred to the committee on secretary's report.

The president appointed his committees as follows:

Committee to wait upon the Illinois Telephone & Telegraph Company: L. A. Frazee, of Indiana; Geo. N. Bandy, of Iowa, and W. G. Thompson, of Ohio.

Committee to consider the secretary's report: Henry A. Barnhart, of Indiana; A. S. Hawley, of Iowa; W. G. Jones, of Ohio; E. P. Cheegle, of Illinois; E. H. Moulton, of Minnesota; W. Mathews, of Kentucky; C. E. Marsh, of Michigan; J. M. Kennedy, of Missouri, and W. F. Goodrich, of Wisconsin.

This concluded the business of the first session, which closed after an urgent and eloquent exhortation on the part of the secretary, asking the members to be prompt in their attendance at the business sessions.

PROCEEDINGS ON WEDNESDAY

THE second session of the convention began at two o'clock Wednesday with an attendance nearly double that of the opening day. The first business in order was the report of the special committee appointed to ascertain the intentions and plans of the Illinois Telephone and Telegraph Company. This report probably awakened as much interest as anything which took place during the convention from the fact that every Independent company in the West is hoping for a connection with Chicago.

Mr. Thompson made a verbal report on behalf of the committee. He said that the committee had waited upon President Wheeler, of the Illinois Company, who informed them that his company had as yet paid no attention to the long distance feature of the business. He wanted it understood, however, that his company was the most Independent of Independents. In the early spring he expected to complete a cable to the west side and would then take up the question of long distance connection. As soon as practicable he would make such connections with any company which could furnish good service. He furthermore promised to send a representative to explain the plans more in detail to the convention.

The report was accepted, and the president called upon Mr. Wasson, of Clinton, Ill., to explain a matter which he had in hand. Mr. Wasson said that he was arranging to make an exhibit of out-of-date telephone devices at the St. Louis exposition, which would illustrate the evolution of Independent telephony. He asked the endorsement and co-operation of the association.

On motion of Mr. Thompson, of Ohio, the association endorsed the work and urged its members to co-operate and assist in the enterprise.

Mr. Gary, of Macon, Missouri, addressed the convention, calling attention to the unjust classification in freight rates on dry batteries, which, he said, were still based on the rate for the old wet batteries with the extra liability of breakage involved. He had also found freight rates to be unjust on the return of empty reels and he complained of the attitude of the railroads toward the smaller exchanges, compelling them to give free telephone service. Mr. Holdoegel, of Iowa, claimed that the freight rate on telephones was five times that on sewing machines. The discussion revealed the fact that some Independent companies had had difficulty in getting the railway and express companies to use their telephones at all, even on a free basis.

Mr. Meyer, of Kentucky, moved that a committee of three be appointed to investigate the situation as regards transportation companies. Mr. Gary moved as a substitute that three committees of three each be appointed, to take up the questions of freight rates, and the attitude of railroad and express companies, respectively.

At this juncture the secretary asked Mr. Symes, of the Southern Electrical Company, of Nashville, Tenn., to step to the desk. He then tried to return Mr. Symes the five dollar membership fee paid by him, on the ground that he was interested in a Bell company and was therefore not eligible. As Mr. Symes refused to take the money, the secretary moved that the membership of Mr. Symes be revoked. The motion was carried without a dissenting vote.

Mr. Barnhart, of Indiana, chairman of the committee appointed to take action on the recommendations contained in the secretary's address, read the report of that committee.

The report stated that the committee had been in session four hours with all the members present, except those from Ohio and Missouri, and in addition had had the counsel of many outside of the committee. The committee considered the by-laws of the association entirely inadequate and recommended the adoption of new ones. The committee recommended that a sub-committee be appointed, to consist of Messrs. Hull, Moulton, Cheegle and Goodrich, to draw up a new constitution and by-laws.

The committee further recommended that the association be incorporated without capital stock.

That the territory embraced by the association be extended.

That the membership fee be $5.00 a year, and more, if found necessary.

That a uniform contract be drawn up for toll lines and rates among the exchanges based on the number of subscribers.

That a permanent committee be appointed to carry out the recommendations of a special committee, to consist of Messrs. Hull, Rex, Coleman and Barnhart.

President Hull then announced that Prof. J. C. Kelsey, of Purdue University, would read a paper on "Standardization of Apparatus," but before he was introduced, A. L. Tetu, of Louisville, Ky., interrupted with a remark that created a very interesting discussion.

It is of such vital importance to the Independent interests that it is quoted below practically verbatim:

MR. TETU: I would like to know if there has been a canvass made of the delegates with a view to ascertaining if they are strictly Independent men. I have reason to believe that there are men here under the guise of Independents who are not strictly Independent men.

PRESIDENT HULL: I will say, Mr. Tetu, that there has not been a canvass made.

MR. TETU: I think perhaps they might be here, and I move that a committee be appointed to canvass the delegates and to admit no one unless he is properly vouched for. I made the same motion last year because I saw there were such men here, and I have been driven to such a position to-day because I saw there were Bell men on the floor.

PRESIDENT HULL: It has been moved and seconded that a committee on credentials be appointed whose duty it shall be to see that none are admitted to our proceedings except those who are in truth Independent operators.

MR. J. G. SPLANE (Pittsburg, Pa.): Mr. Chairman, I also wish to add to the remarks of the gentleman from Louisville, that I myself saw a man that I knew to be a direct representative of the Bell people, and he is also a member of this association, from what I learn.

PRESIDENT HULL: Who was he, Mr. Splane?

MR. SPLANE: The gentleman I refer to is from Pittsburg, Pa. He had an article put in the Pittsburg papers announcing the meeting of this association in Chicago, and giving a little synopsis of it. He went on to say that Pittsburg would be represented by this party in question. I have no hesitation in saying who the gentleman is. He is known as Fred Deland.

PRESIDENT HULL: Is Mr. Deland in the room?

A MEMBER: He was in the corridors this morning.

PRESIDENT HULL: Does anyone know if he is here?

(No response.)

MR. WATSON: This is a representative body of men, but we are not doing business on business principles. It is very seldom that we have conventions without a committee on credentials. In our State association, at Cleveland, we found a dozen Bell men. I move that a committee on credentials be appointed.

PRESIDENT HULL: The motion has been made. Are there any remarks on the question?

After the reading of papers by Prof. Kelsey and Mr. W. C. Polk, of Kansas City, President Hull appointed a committee on credentials, consisting of A. L. Tetu, Chairman; J. G. Splane, and W. M. Heseltine. This committee made the following report:

Your committee to whom was referred the question of membership, begs to report that inasmuch as the time will not admit of a thorough canvass being made, the association must depend upon its loyal members to make known the presence of any one interested in any enterprise antagonistic to the Independent Telephone movement.

And further recommends that at future conventions no one be admitted to sessions of the association except upon presentation to a regularly appointed door-keeper, of a certificate bearing the endorsement of the company or firm he represents, and further endorsed by the secretary of the association.

(*Signed*) A. L. TETU, Chairman
J. W. SPLANE
W. M. HESELTINE.

The report was unanimously adopted.

W. C. Polk, of Kansas City, Missouri, was to have read the paper on "Standardization of Construction." Owing to an accident he was unable to be present, but he sent his able paper, which was read by the secretary. Mr. Polk's paper is given in full elsewhere in this issue.

After some discussion, it was moved by Mr. Coleman that the matter suggested in the two addresses be referred to the committee on permanent organization, so that a standard can be worked out and maintained.

The motion prevailed.

H. D. Critchfield, representing President Wheeler, of the Illinois Telegraph and Telephone Company, was introduced and addressed the convention.

The telephone company, he said, has twenty-one miles of tunnels covering the loop district, and will have ninety-two miles when the system is completed. It is the purpose to give toll lines connection when the company can connect with the right apparatus, that is, apparatus over which its patrons can talk, not necessarily automatic apparatus. One thing is certain, the company will not give toll line connection where the service will be unsatisfactory to its subscribers. The company proposes to take up in the early spring the work of building toll lines from fifty to one hundred miles in length, radiating out from Chicago, for the purpose of connecting with toll lines from the several States. This work will be taken up in the spring, not by the Illinois Company, but by another company now in the embryo. He thought that entrance into Chicago could be obtained by the Independent companies by next fall. In answer to a question, Mr. Critchfield denied emphatically and specifically that the Illinois Company had or would have any connection whatever with the Bell Company.

He said: "The company has absolutely no connection with the Bell Company, either directly or indirectly. Any statement to the contrary is absolutely false, utterly and positively. Not only has it no connection with the Bell Company, but it will not do business with anyone affiliated with the Bell Telephone Company in any way." This positive statement was received with enthusiastic applause and was evidently what the Independents had been wanting to find out.

THURSDAY'S PROCEEDINGS

THE closing session of the convention opened Thursday morning with the report of the sub-committee, appointed to draft temporary by-laws for the guidance of the association until a new and permanent constitution can be drafted.

The report was adopted with an amendment making the dues payable before July 1st.

O. Rex, of North Manchester, Indiana, being detained on committee work, the secretary read his paper on "Competition Between Independent Companies and Farmers' Mutuals." Mr. Rex's paper is printed in full on another page of this issue.

Hon. Henry A. Barnhart, of Rochester, Ind., followed with a paper, "Where Should the Line of Demarcation be Drawn between Independent Operating and Manufacturing Companies and the Bell Company?" which appears in another part of this issue.

At this juncture the president named the following nominating committee: Messrs. Rex, of Indiana; Matthews, of Kentucky; Bandy, of Iowa; Friend, of Illinois; Buffum, of Missouri; W. J. Jones, of Ohio, and Zimmerman, of Kansas.

When the committee had retired, David Prewitt, of Winchester, Kentucky, read a paper on the subject, that will be found on another page: "What Should be the Representation in the Conventionsof the Inter-State Independent Association in Voting?"

J. S. Brailey, Jr., of Toledo, Ohio, followed with an address on "Independent Toll Line Systems, and is the Time Ripe for Merging?" He said in part:

"Independent telephone toll and long distance systems have been constructed during the past three or four years, while exchanges have been building during ten years. In large cities it is difficult for Independent companies to maintain their business without a toll service. The Independent long distance systems to-day are confined to particular States. Ohio, Indiana, Michigan, Kentucky and Missouri have constructed long distance systems. Some of these State systems are being connected and give perfect service. You can talk from St. Louis to Louisville via Indianapolis, with perfect service. Ohio and Indiana have made arrangements to connect at Richmond, Indiana, next year. By next year probably all of these Independent systems will have arranged to connect. In the West there has been great progress in this work. By another year there will be through connection between St. Louis, Kansas City, and Houston, Texas.

"From these conditions it can be readily seen that we will soon be able to talk over Independent lines, not one hundred miles, but three or four thousand. By the time the next convention meets we will be able to talk as far as can the Bell Company.

"Another important matter is the financial part. The Independent systems have been built without the aid of any of the great financial kings. The consolidation of long distance systems will do more than anything else to attract the attention of capital to the financial importance of the Independent telephone movement.

"The question is, Is the time for consolidation opportune? I do not think the time has yet come. Before this is done the system of each State must be perfected and thoroughly established in business. The time will not be ripe for one year or two. I predict without hesitation that in two years the long distance service of the Independent systems will be superior to that of the Bell. Before this consolidation can take place there must be traffic arrangements for the exchange of business. We have heard a great deal about monopoly and talked a great deal. But we have referred to great exchange systems. The question of long distance business is entirely distinct. Small investors should not fear consolidation along this line, but should welcome it because it will do more to increase telephone values than any other one thing."

Mr. Brooks, of the Twin City Telephone Company, Minneapolis, Minn., offered the following resolution:

Resolved, That the president appoint a committee of three to investigate the action of the postmaster-general of the United States relative to ordering Independent telephones taken out of post-offices. The committee shall report as often as it deems proper to the president. The officers of the association and the committee are to devise whatever action in their judgment may be necessary.

A warm discussion followed, during which Postmaster-General Payne was charged with being a creature of the Bell Company and of misusing his high office to further the business of that company. The resolution was adopted, together with an amendment to the effect that President Roosevelt be informed of the result of the investigation.

The president appointed A. L. Tetu, of Kentucky; Mr. Brooks, of Minnesota, and Mr. Thompson, of Ohio.

On motion of Mr. Gary each member of the association was asked to write to his Congressman in regard to the matter.

On motion of Secretary Coleman a committee of three was ordered appointed to act as press committee and get after the publications of the Bell Company throughout the country.

The president announced the following committees:

On freight rates: Theodore Gary, of Missouri; David Hood, of Kentucky; J. S. Brailey, Jr., of Ohio.

On the refusal of railroads to pay for telephones: Mr. Buckham, of Missouri; Dr. Herr, of Iowa, and Mr. Bastin, of Kentucky.

On express rates: Messrs. Bandy, Thorne and Hall.

Press committee: Coleman, of Kentucky; Barnhart, of Indiana, and Hazeltine, of Ohio.

A paper was read by W. H. McDonough, of New York, on the subject, "Are Our Telephone Periodicals Sufficiently Careful as to the Business Relations Sustained by Contributors?"

The nominating committee reported the following nominations, which report was adopted:

President—Hon. Henry A. Barnhart, of Rochester, Indiana.
Vice-President—E. H. Moulton, of Minneapolis.
Secretary—E. M. Coleman, of Louisville, Kentucky.
Treasurer—A. B. Conklin, of Aurora, Ill.
Executive Board—
Illinois—Hon. Charles E. Hull.
Iowa—J. S. Bellamy.
Indiana—O. Rex, chairman.
Wisconsin—Richard Valentine.
Ohio—W. Guy Jones.
Missouri—H. G. Conger.
Kentucky—W. Mathews.
Kansas—Charles E. Wells.
Pennsylvania—J. G. Splane.

The convention then adjourned.

In the evening an elaborate banquet was served. The attendance was much larger than last year.

MANUFACTURERS WHO WERE THERE

MANUFACTURERS and dealers had a large and fine display of exhibits for the purpose of interesting those attending the telephone convention. Following is a brief description of the various displays.

North Electric Company, Cleveland, Ohio. The exhibit was in charge of President C. H. North; F. F. Sapp, manager of the sales and advertising department; G. B. Pratt, representative of the middle west, and H. H. Hendrickson, of the eastern states. The company had a display of telephone switchboard parts, and displayed photographs of various types of exchanges installed.

The National Carbon Company, of Cleveland, was represented by M. H. Moffett and A. V. Ward.

The Eureka Electric Company, of Genoa, Ill., showed, among other things, for the first time its improved express switchboard. I. J. Kusell was in charge.

Frank B. Cook, of Chicago, was represented by F. B. Cook, James Cook, F. R. Parker and Charles E. White. The exhibit included a self soldering heat coil which attracted much attention. The company manufactures protector apparatus and terminals.

The Elmore-Fowler-Jacobs Company, Chicago and Milwaukee, dealers in cedar poles. The room was in charge of Eltinge Elmore.

The Automatic Electric Company, of Chicago, showed a 10,000 type automatic switchboard and two telephones in connection, similar to the equipment of the Illinois Telephone & Telegraph Company. J. F. Crook, H. S. Durant and H. D. Ogden were in charge.

The Signalphone Company, of Milwaukee, showed a combined fire and police alarm box with both telephone and telegraph connection over the same wire without interference. E. E. Salisbury was in charge.

The Valentine-Clark Company, of Chicago, dealers in cedar poles, was represented by E. H. Valentine and E. L. Clark, secretary and treasurer, and F. L. Gillam, traveling superintendent. They showed photographs of their different yards.

The Crawfordsville, Ind., Wire and Nail Company, was represented by Richard Schweitzer.

The Ohio Valley Glass Company, manufacturers of insulators, was represented by H. E. Cobb.

The Allen-Hussey Company, of Chicago, showed their intercommunicating telephones and electrical specialties. C. J. Huff, president, and James F. Boland, secretary, were in charge.

The Miller Anchor Company, manufacturers of anchors for pole lines, was represented by G. H. Miller, president, and F. B. Miller. These gentlemen distributed a unique and the most appropriate souvenir in the shape of a miniature anchor.

The Maltby Lumber Company, of Bay City, Michigan, dealers in poles, were represented by E. E. Reynolds.

The Western Telephone Manufacturing Company, of Winthrop Harbor, Illinois, had a large exhibit. Among the articles displayed was a flat top switchboard, holding 800 lines without transfer or multiple. This is a radical departure from all other switchboards. The company is about to install one at Kenosha, Wisconsin. The exhibit was in charge of James E. Keelyn, general manager; W. G. Peacock, engineer, and E. Schwartz, mechanical engineer.

The Warner Electric Company, of Muncie, Indiana, showed the Warner generator, with T. W. Warner, president, in charge.

The Indiana Steel and Wire Company, of Muncie, was represented by Robert Miller.

The Chicago Telephone Supply Company showed a full line of telephones and switchboards in operation. G. A. Briggs and R. L. McCoy were in charge.

The New Haven Novelty Machine Company had a novel exhibit demonstrating by electric tests, under water, that its apparatus is moisture proof. H. Grant Thompson, treasurer and manager, and Charles Luke, superintendent, were in charge.

The General Engineering Company, which is putting in plants at Lincoln, Nebraska, and Sioux City, Iowa, showed the plans and photographs of the work under construction. E. W. Hammer, president, and H. J. Minhinnick, secretary, had charge of the headquarters.

The Monarch Telephone Manufacturing Company, of Chicago, showed, among other things, two transmitters, one of which went through the flood at Kansas City, and the other through a fire. Both can still talk all right. They also had a transmitter under water, and a display to show the power of their generator to ring through 100 bells. E. E. Yaxley, general manager, I. S. Hubacher, superintendent, and Walter H. Trimm, sales manager, were in charge.

The Stroud Telephone Specialty Company, represented by Harold D. Stroud, exhibited its new measured service apparatus. This exhibit was one of the most valuable of the new inventions shown.

W. H. Anderson & Sons, of Detroit, had a display of construction tools with T. H. Tapp and W. R. Anderson in charge. Special attention was given to the company's new diamond expansion drill.

The Central Telephone and Electric Company, of St. Louis, manufacturers of switchboards and construction material, showed a full line of terminal and distributing boards. James S. Cuming, president and general manager, C. H. Wallis, vice-president, and W. F. Gradolph, consulting engineer, were in charge of the exhibit. During the convention this company secured the Missouri rights for the adjustophone.

The W. J. Barr Manufacturing Company, of Cleveland, was represented by W. J. Barr and L. G. Le Bourveau, of Chicago. The company manufactures transmitter arms for the trade.

The Williams-Abbott Electric Company, of Cleveland, showed a line of telephones and switchboards. L. Sands and J. A. Wright had charge of the exhibit.

The Gordon Battery Company, of New York, was represented by E. M. Deems, of Chicago, the western agent, with a full line of batteries.

H. B. Camp Company, of New York and Chicago, manufacturers of clay conduits, had an exhibit in charge of J. A. Hammett.

Fulmer, Kuester, Schroeder Company, of Chicago, dealers in cedar poles and posts, was represented by J. W. Fulmer. The company gave away a very attractive souvenir in the shape of a small leather pocketbook. It had a display of miniature poles and rustic chairs throughout the corridors.

The Western Lumber and Pole Company, was represented by B. F. Vreeland, its president, who came from Denver, Colo.

Lindsley Brothers Company, dealers in poles, was represented by E. A. Lindsley and J. A. Navarre.

Raber & Watson, of Chicago, dealers in poles, had two decided novelties in their exhibition. One was a human pole in the shape of a colored man seven feet eight inches high and still growing. The other was a circular railway delivering poles to its customers, showing complete telephone service, in miniature. A D. Watson and M. E. Brown were in charge.

The Nicholas Selecting Company, of Rochester, New York, showed something new in the shape of a device for giving private service on a party line. C. E. Nicholas, of Columbus, Ohio, Willard G. Rich and Clarence A. Rich, of Rochester, New York, were in charge of the exhibit.

The Chicago Writing Machine Company had an attractive display of their Adjustaphone. A gold telephone attracted a great deal of attention. It was very handsome and is to be presented to President Roosevelt. In charge were R. E. Hill, vice-president and general manager; F. W. Pardee, corresponding secretary, and F. W. Krengel, special representative. They report a most extraordinary avalanche of orders.

The Stromberg-Carlson Telephone Manufacturing Company did not have an exhibit, but represented at the hotel by Alfred Stromberg, E. W. Stiger, J. J. Nate, R. R. Tyler, Garrison Babcock, and F. S. Rotchka.

The American Electric Telephone Company of Chicago, had a special exhibit at the factory which attracted a great deal of attention. As a special feature a four bar generator was shown, to ring through two hundred bells. P. C. Burns, president; J. G. Ihmsen, general manager, and H. P. Clausen, engineer, represented the company at the hotel.

The Swedish-American Telephone Company, of Chicago, was represented by E. B. Overshiner, A. B. Overshiner, F. L. Macklin, and H. Russell, who were at the hotel.

The International Telephone Manufacturing Company, of Chicago, was represented by Henry Shaffer, president; W. E. McCormick, vice-president, and F. L. Middleton, sales manager.

The Farr Telephone Construction Supply Company, of Chicago, was represented by C. W. Farr, president.

The Holtzer-Cabot Electric Company by E. R. Harding, manager.

The Hipwell Manufacturing Company, of Alleghany, Pennsylvania, sent its president, A. A. Hipwell, and secretary, Todd Hipwell, as special representatives.

The Standard Telephone & Electric Company, of Madison, Wis., distributed one of the best souvenirs of the convention. It consisted of link cuff buttons, one end representing a transmitter. The demand was enormous and Jas. H. Parish, the Standard's general manager, was sought after by friend and stranger.

The American Conduit Company, of New York, Chicago, and Los Angeles, had an interesting exhibit of its fiber conduits in different diameters. It exhibited a section of conduit encased in cement, showing the actual condition of the street. Its Western manager was in charge.

The Standard Underground Cable Company, of Pittsburg, was represented by J. R. Wiley, E. J. Pietzcker, and Wm. Rogers, of Chicago, and A. A. Anderson, of Pittsburg. It showed telephone cables and rubber covered wire.

The Elliott Addressing Machine Company had its machine on exhibit, in charge of A. R. Baker and R. St. John.

The John A. Roebling's Sons Company was represented by Messrs. Bailey, Slingluff and Affleck.

The Ewing-Merkle Electric Company, of St. Louis, was represented by William C. Brown, vice-president.

The Wakefield Supply Company, St. Louis, was represented by R. S. Wakefield.

The American Carbon and Battery Company, St. Louis, was represented by T. P. Gleason, treasurer.

The Vesta Storage Battery Company, of Chicago, was represented by Mr. Nemoyer and Ward S. Berry. The company was showing a new alkaline battery which it is claimed will revolutionize the battery business.

The Crouse-Hinds Electric Company, of Chicago, exhibited its new guy anchor. F. F. Skeel, manager, and A. C. Dulsky were in charge.

The Moon Manufacturing Company, of Chicago, was represented by H. E. Procunier manager, and L. H. Wood, sales agent. It was showing terminal heads and telephone cables.

The Chicago Die and Electric Company, of Chicago, had an exhibit of fuses, copper joints and lightning arresters, in charge of Martin L. Bowbeer.

The F. Bissell Company, of Toledo, exhibited cable boxes, distributing boards, and a full line of construction supplies. W. S. Bissell, E. B. Terry and M. S. Walker had charge. The company is giving away cable charts.

The Kester Electric Manufacturing Company, of Chicago, was represented by A. J. Witherell, president; F. G. Dickerson, manager, and J. E. Goodwin, salesman. The company was showing self-fluxing solder and solder paste.

The Sterling Electric Company, Lafayette, Ind., was represented by the following gentlemen, at their Room No. 128 on parlor floor: W. E. Doolittle, president; H. A. Taylor, vice-president and secretary; S. B. Fowler, electrical engineer; H. S. Bullock, superintendent; H. T. Doolittle, purchasing agent; Evan Shelby, sales manager; K. V. Murry, traveling representative; G. W. Metcalfe. Its main exhibit was a showing of its new lamp signal, lamp supervision magneto switchboard for small exchanges, varying from 100 to 150 drops; also its selective party line system, various types of its common battery instruments and 30 pictures showing some of its large common battery installations.

The Illinois Electric Company, of Chicago, was showing the Peirce patent construction specialties and for the first time "Illinois pole changers." C. J. Litscher was in charge.

The National Wire Corporation, of New Haven, Connecticut, gave public demonstrations to prove the quality of its wire. Among others, the company showed double galvanized telephone wire in three grades, steel, B B and extra B B. R. B. Abbott, Western manager, was in charge. Mr. Abbott was for many years with John A. Roebling's Sons Co.

THE PRESIDENT'S ANNUAL ADDRESS

By C. E. Hull.

It now becomes my pleasure and duty to call to order this, the Third Annual Meeting of the Inter-State Independent Telephone Association and address you.

We meet to-day in the city of our birth under auspicious circumstances. The growth of our movement as an association has been phenomenal. It is our glory that we have brought together in a common fraternity, men engaged in a common calling and laboring for the same noble end. Throughout the State that we represent we know each other as never before. As my lamented predecessor well said of us individually, "We are of the people; our business had its origin in the needs of the people and in their efforts to supply those needs. It is for this reason that the Independent Telephone Movement has always had the moral as well as the financial support of the public. In this fact we find the secret of past success and the guaranty of future greatness."

What is true of us as individual operating companies, is true of us as an association, and will continue so if judicious common sense prevails.

The work that should be done in the three short sessions of this convention is of vast importance to us all. I urge prompt attendance upon all our deliberations and bespeak your very careful consideration of all business transacted. Nothing that is for our common weal should fail to receive our indorsement and earnest support, and nothing that militates against the general good of us all should escape our censure and denunciation.

The Secretary, with the assistance of the other members of the Convention Committee, has prepared an excellent programme on vital subjects. The papers presented for your consideration here have been carefully prepared by men thoroughly competent to exhaust the subject matter. Nevertheless, we expect to invite full and free discussion of all matters treated upon, either immediately following each number on the programme or through the medium of the question box, as this body may determine. Ample provision has been made for your entertainment during the interim between the sessions. In fact, everything has been done to make this convention both pleasant and profitable, as have been the two which preceded it. As a Convention Association we have just cause to "toot our horns" and proclaim our success.

So much for one week in the year. What of the other fifty-one? Shall there be so much joy over the one week that the others are forgotten? No. Threatening clouds that have arisen within the past twelve months warn us that there is much work for us as an Association and as individual operators as well. In order that the work in hand and to be taken up may be successfully maintained, we should at this meeting revise our constitution so that our field may be broadened and our Association put on a solid financial basis. We should have well equipped and permanent headquarters.

It is true, and pity it is, that, taken as a whole, Independent telephone investors have in a great degree lived each for himself. Feeling strongly intrenched in his own locality the disposition has been to get all you can and keep all you get. This disposition upon the part of some of the large operating companies has driven from our ranks many who preferred to remain Independent operators. We need more business in our business.

Do not think, gentlemen of this association, that I am a pessimist. I am an optimist on most things and especially on the future of Independent telephony. I want, however, to strongly urge upon you the great need of a solid association which will be of valuable assistance to all of its members every week and each day in the years to come. Plans for such an association may be matured by the committee which I hope may be appointed, on revision of the constitution.

We should, as has been suggested at former meetings, take up the question of a press committee. The press is the great educator of the age. It is a fact conceded even by our national enemies, that in no country in the world can you find a people to compare with the high standard of intelligence found among our own people—the common people, the wage earners, laborers, mechanics and artisans—people from whom we receive our patronage. The people in all quarters need to know the merits of the fight we are making. It is difficult to win against public sentiment and I conceive it our duty to create and foster an aggressive sentiment in our favor, both as public benefactors and as an avenue for sound financial investment.

There have been numerous suggestions within the past year that this Association adopt a distinctive national emblem for the Independent telephone, and I consider the matter worthy of the attention of this body.

Other matters of interest to this association are indicated by the official programme. The subjects so suggested should have wise consideration and a careful, conservative course taken as to the adoption of any new plans and policies. An earnest effort should be made to incorporate into our constitution only such ideas as may carry our organization successfully through the breakers which sooner or later may confront us.

Before we take up the active work of the session, I want to congratulate the members of this Association individually upon whatever successes have attended them since our last meeting and to assure them that whatever measure of success has come to this organization is due to the hearty co-operation of you all.

WHERE SHOULD THE LINE OF DEMARCATION BE DRAWN BETWEEN INDEPENDENT OPERATING AND MANUFACTURING COMPANIES AND THE BELL?*

By Henry A. Barnhart.

A LONG time ago, so long probably that the participants in the incident are beyond possibility of disputing it, a boy said to his father: "I am going to set the bad line of demarcation on my dog by cutting his tail off, to make him be good." "Then cut it off up close to his ears," said the wise parent, "and you'll have him marked to stay." We would not fix so harsh a line of demarcation to separate us from the Bell Telephone Company and its oligarchical characteristics. Instead we may, with propriety and perfect safety, permit it to go on in its present methods of slow suicide, and then when its tactics prove fatal it can never be said that any of its life blood is on our hands.

HENRY A. BARNHART.

The line of demarcation between the Independent and the Bell Company is already fixed. It was arbitrarily established by the Bell Company, and I want to quote the Hon. Mark Hanna just far enough to say that we can well afford to "keep on letting well enough alone" by continuing to stand aloof from any compromise whatever with the Bell Company, and to give the people the best and most popular telephone service at prices they know to be legitimate and fair. The public no longer tolerates rate extortion, nor does it take kindly to the cut rate method which must sooner or later replenish its inadequate treasury by increased denmands from its patrons.

In other years the Bell Company not only refused the Independent interests recognition, but it tyrannically oppressed them by its wealth of influence, its power with legislative tribunals, and its resort to ways that were dark and tricks that were shamefully more than cunning devices and shrewd manipulation. It hired great lawyers to intimidate Independent telephone capital by keeping it in hazard through persistent false claims of priority of patent, and by the blighting annoyance of litigation on every conceivable pretext. It employed suave and resourceful agents to belittle, malign, and cry down every step of Independent telephone endeavor, and these earned their salaries so well that Bell monopoly fed and fattened unmolested in many places where there was a universal public outcry for relief from the notoriously arbitrary and extortionate Bell business methods.

Notwithstanding all of this, Independent telephony has grown and prospered, and pleased until there are increasing evidences that the Bell Company is seeking compromise and good will from that which it sought to destroy by slander and intimidation. In my own State the Bell Company not only seeks mutual business relations with Independent interests by the so-called sub-lease plan of trying to check the growth of competition that looks overwhelming in its aspect, but at the last session of the legislature it sought to lengthen its lease of life by introducing a bill which, in substance, granted all telephone companies the right to construct equipment in any of the highways of the State without let or hindrance. But cunning as the move was, both in conception and purpose, it is hardly necessary to say that the Independent interests balked the high handed effort to revive waning Bell advantages and selfishness, and that the parchment on which the bill was written finally served the well merited purpose of cigar lighters for the State house janitors.

And yet with all this affront which the Bell Company has been hurling as obstruction against the demand for the development of Independent telephone service, I am charitable enough to counsel evasion of fight unless absolutely necessary in self-defense or in clearing the way for the forward march. Fighting is oppressive of energy and destructive of force that could be turned to profit if judiciously directed. Beside, it is a well established fact that the public will side with the right as soon as it is demonstrated, and fighting is a last resort in public sentiment of this day. When I was a boy I heard of a man who made thirty dollars in one year by minding his own business, and I have ever since observed that we gain little by stopping to indulge in strife and contention so long as the way is clear for us to move on in good intentions.

This premise, however, should not be misconstrued to mean that the surrender any rights or grant any favors to the domineering and belligerent Bell Company. Indeed, successful promotion of our interests demands constant activity and alertness to foil the schemes of our once powerful and still resourceful rival. While the erstwhile Bell monopoly seems to be scourged and repudiated into a retreat, it may be like the story of the bravado who boasted that there were no such things as ghosts, and placed a wager that he could remain alone in a ghost-haunted graveyard for two hours at midnight without fear of molestation. The test was given and he lost. Soon after reaching the scene of reputed phantoms he beheld a great white spectre arise and approach him and he precipitately fled. Over fences and across fields he sped like a shadow but the ghost followed. Then he fell, face downward, exhausted, and as he lay terrorized and panting he glanced up to see if his pursuer had vanished, when he beheld it hovering right over him and it said, "We've been going some, haven't we?" "Yes," he replied, "and if I recover my wind and you keep after me, we'll go some more."

That fellow was like the Bell Company, a boaster and a lion, until dismayed, and then he fled and "played possum," and voluntarily promised to "go some more" if pursued further. We have the Bell Company scared and on the run, and it will "go some more" if we keep after it.

So much for the line of demarcation between Independent and Bell operating. And what of manufacturing? Are we not already barred from the use of Bell-made apparatus by the same line of demarcation that the Bell has established against mutual operating? We certainly are so far as openly made Bell apparatus is concerned, and if there is Bell capital in so-called Independent factories, this association should know it and protect its membership and Independent telephone interests generally from its imposition.

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* Address before the Inter-State Telephone Association, Auditorium, Chicago, December 10, 1903. Mr. Barnhart is president of the Rochester Telephone Company, of Rochester, Indiana.

We get neither patronage nor recognition of any kind from the arrogant Bell Company, and we should not contribute strength to its substance by buying apparatus from manufacturers who sail under Independent colors, and turn the profits over to the Bell treasury and corruption fund.

But over all and above all we must strengthen the line of demarcation established by the Bell Company, and recognized by the general public, which appreciates the superiority of Independent business principles. Locally we always get the business after a test of mechanical and operating efficiency, but our long distance equipment and connections are deficient in both extent and mechanism. For instance, a half million Independent telephones are in operation within a radius of two hundred miles of Chicago, all serving territory within the immediate commercial environment of Chicago, and, if I am not mistaken, not a single one of them can get connection with this most important business center.

Here is a condition of profound concern for both Chicago and the Independent telephone movement. Both have mighty interests in common and nothing but the monopolistic partition of Bell telephone greed separating them. Chicago business interests need the Independent telephone toll line connections with their thousands upon thousands of contiguous business patrons, and they need an Independent local service to enable them to break down monopoly telephone rates to a basis of justice to patrons, and yet of safety to investors. Likewise the Independent telephone interests need Chicago connections for their patrons as badly as Chicago business men need the profit and convenience of such a service, and the influence which keeps us out of Chicago is costing her business men millions of dollars in excessive rentals and trade losses every year, and this all goes to Bell telephone profits. In other cities, like Indianapolis, Louisville, Cleveland, etc., where the Independent telephone service has been admitted, business men and the masses have arisen to call the municipal authorities blessed. And a like crown of glory awaits the powers of Chicago who will invite Independent telephony to enter the Chicago field, and demonstrate to its millions of progressive and deserving people the superior merit of the service, and the mighty commercial advantages which its toll line connections would furnish.

This is a line of demarcation between Independent and Bell service which should be obliterated, and we must do it. We have won the contest in a local way wherever we have given the people what it wants. We have done this both through superior service and the good will of the public which Bell Company greed and intolerance have alienated. We can accomplish the same grand results in long distance service if we will, and it is a duty not only to self interests but to the public that we do so without delay.

But to accomplish this, sirs, we must have a more concerted and a more binding union of mutual interests, one with another. We cannot hope to cope with centralized Bell Company advantages if we continue business on the ancient and loose-jointed method of "every fellow for himself and the devil take the hindmost." We must not tolerate factional disturbances within our ranks, nor encourage the confiscation of Independent property by either buying supplies of opposition interests or selling supplies to opposition uprising against established Independent interests. These are distinct lines of demarcation between our business ventures and fullest possible success which any intelligent man can readily distinguish. Therefore if we will continue to let the Bell Company maintain its line of demarcation between its avarice and public welfare, and not permit it to "come over into Jordan," even if it so elects as a means of self-preservation, and if we will protect ourselves against imposition by lack of progress and of universal loyalty within our own ranks, our business relations will become more agreeable, our incomes more adequate, and our property more valuable.

WHAT SHALL BE THE VOTING REPRESENTATION IN THE CONVENTIONS OF THE INTER-STATE TELEPHONE ASSOCIATION?*

By David Prewitt.

If this association was organized solely as a social telephone club it has been a great success, for it has introduced operators and manufacturers from all over the country and has furnished them much pleasure and entertainment. If the only aim of the organizers of this association was to make of it an educational society they have reasons to congratulate themselves, for through it telephone people have exchanged ideas that have left each the wiser. Even if this association was merely a protege of the manufacturers—a sort of Fall Festival—whereby the operators might be brought to the city *en masse* more economically than they could be seen individually, I doubt not but results would justify their business acumen. But if all these and these only were the objects of this association, a paper on "voting representation" is hardly worth discussing. Even if this association has powers that are advisory over its members, the question of representation is not a vital one. For it is bad enough to have bad advisers, but not so bad after all, if the advice is not compulsory. But if this association ever has delegated to it, by its members, powers that are mandatory, the question of representation in its councils and conventions, becomes one of paramount importance.

First, has the time arrived to delegate such powers to this association? If so, what ought to be the basis of voting representation in its councils and conventions? In the infancy of Independent telephony your subscriber was contented with good service to the other subscribers on the exchange and your interest in the success of your neighbor's exchange was purely sympathetic. Then your subscriber asked—at a fair toll rate—(the telephone public is willing to pay) for connection with neighboring towns and your interest in the exchange in these towns became actual. Now your subscriber is demanding connection with the nearest large city. To-morrow his demands will extend as far as the ingenuity of man will make his voice audible over wire and your actual interest must keep pace with his demands. While on the one hand, this education of the subscriber has made the telephone a necessity and increased its use until you have more business than you can do, on the other hand, it has introduced into your business an additional hazard. You know that the success of your business depends in a large measure upon the action of those over whom you have no control. You are watching him and he is watching you—a condition which may result in panic. If every Independent operator could be assured that every other Independent operator and manufacturer would always maintain his integrity as an Independent operator or manufacturer, the Independent telephone problem would be reduced to a very simple proposition.

How best may this result be obtained? The first thought that suggests itself in this day of trusts and gigantic corporations is to consolidate all the Independent telephone interests in the country into one great telephone company. This was tried by the Bell Company under conditions vastly more favorable than are the conditions that are around us to-day, and did not prove an unqualified success. The public tried it and was tried by it and the public's demand for something better created Independent

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* Paper read at the convention of the Inter-State Telephone Association, in Chicago, on December 10, 1903.

Telephone Consolidation. It would force some of the manufacturers out. The operators being as a class small investors would find themselves only bondholders or possibly employees of a business they formerly controlled.

The second way that suggests itself is, that this result might be obtained by means of contracts between exchange operators and toll line operators. This is valuable, but not comprehensive enough. It does not bind the manufacturer. The operator generally has no notice of who have and who have not entered into agreement. There is the fear of collusion between companies so far removed that you do not know them personally. What is the solution? More than a hundred years ago thirteen liberated colonies found themselves in the same predicament that we are to-day. They had fought their battles and won them as we have. They had a common enemy as we have. They realized that an imminent common danger and that alone had kept them united. They knew that it was necessary to form themselves into an indissoluble whole by such ties as would bind them in times of peace as well as of war. They were unwilling to surrender more rights than were absolutely necessary. They knew that simple treaties between them were insufficient. A novel problem presented itself. They solved it by delegating to a central government only such powers as necessary to a solution of the problem.

Why may we not follow their example? Divide the country into telephone districts. Disregard state lines and taking the larger cities as centers, include the territory, from a telephone standpoint, tributary to them. In each district organize a District Association. Let every Independent company in that district become a member. Let each company send one representative, who may on all questions as may come before a senate have a single vote, but on such questions as come before the house of representatives have a vote in proportion to the size of the company he represents. The questions upon which the delegate would have the single vote or the multiple vote would be determined in advance. Let the members of the district associations delegate to their associations the power to control the sale of voting stock, to make contracts with all telephone companies not members of this association, to settle all questions arising between members of the district association and such other powers as may be expedient.

Let every District Association become a member of this association. Let each member send a delegate to this association, who may on certain predetermined questions have a single vote, while on other questions he shall have a vote commensurate with the aggregate size of the companies, members of the district association of which he is a delegate. Let every district association delegate to this association the power to ratify or annul the sale of any stock by one of its members or any contract it may make for any of its members with a company other than a member of a district association, together with the power to settle all questions that may arise between district associations or a member of one association with a member of another association, and any other powers that may be deemed expedient. Of course, there is a vast amount of detail that would be worked out. This plan may seem novel, and it has its difficulties, but I do not believe they are insurmountable. If it can be put through it will prove an ideal arrangement. It is the great American idea. A management of the owners, by the owners, for the owners.

STANDARDIZATION OF APPARATUS*

By J. C. Kelsey.

BEFORE railways had grown to such extent that they reached the terminals of other railways, each system made use of its own particular standards. For instance, one system had a broad gauged track, another a narrow gauge, and still another, an intermediate gauge. But modern conditions of business have demanded an undelayed interchange of traffic, and it therefore became necessary to adopt a track of such width that trains from all systems could run over it. This resulted in what is called the standard gauge, and all rolling stock is built to operate upon this gauge, making possible the fast and comfortable through train service of the present day.

When telegraph systems were operated by different managements in the different districts of the United States, each management had its own particular style of apparatus and manner of operating it. Some systems used machine operating, and others used the manual method. As a consequence, these systems could not be operated as a unit, and much time and expense was necessitated in getting long distance service, because each system had to handle the message. Like the railroads, business conditions demanded a through service between large cities, and this necessitated a similarity in the style and usage of the apparatus in both sending and receiving systems. This standardization has given to the public a more rapid and reliable telegraph service.

Telephone systems are affected in precisely the same manner as the railroad and telegraph systems. No longer can the telephone subscriber be confined to his own exchange district. He wants to talk with his neighbor, and that neighbor may be one mile, or forty miles distant, or he may be one thousand miles away. In any case, the subscriber wants to hear his neighbor's voice, or his customer's voice, or his clients' voice, just as plainly as in ordinary conversation, and he does not care to have the message repeated, any more than the passenger bound for New York would care to be awakened at Buffalo, and ordered to get on another train. Therefore, telephone transportation demands standard tracks, in order that through connections may be made, and apparatus that will connect with this track at both sending and receiving systems.

J. C. KELSEY.

The standard gauge track of the telephone transportation system has already been decided upon. It is a metallic line, composed of No. 8 copper wires. Whatever the locality of this track, or line, the characteristics are in general the same. It is well known that this line must be transposed, and well balanced, in order to be absolutely quiet under all disturbing conditions of considerable length. When in connection with a local exchange, it has a peculiar power of disclosing inconsistencies in the local connections, which would never be revealed in short toll line connections. But if this track, or line extend into territory where trolley wires, high tension and electric light wires abound, it develops more decided characteristics. It becomes super-sensitive, and may be said to be looking for trouble. The least unbalance in the local connection circuit will cause the now super-sensitive line to roar vigorously as to forbid any conversation.

As the interuban trolley lines, with their accompanying high tension wires invade the country, each and every exchange operator will inevitably experience this changed condition of his toll lines.

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* Paper read at the convention of the Inter-State Independent Telephone Association, in Chicago, December 9, 1903. Mr. Kelsey is professor of telephone engineering at Purdue University, Lafayette, Ind.

His local lines and switching apparatus, which once gave him good toll service, will be comparatively useless, as the sensitive line will not permit of an unbalanced connection. If the sensitive line connects with an exchange using series drops in circuit, the connection will be too noisy for usage. If it connects with a common return system, grounded or not grounded, great noise will result. If it connects with a metallic system, with lines having bad points and of careless structure, it is noisy also. If it connects with a well balanced system, but using cheap, or poorly designed transmitters, then poor transmission will result. If it connects with a common battery system using twenty volts battery pressure, the connection is noisy, and the signals rendered inoperative. If it connects with a forty volt common battery system, the same condition obtains. Therefore, the crying need of standardization begins with a standard coupler, called the repeating coil, which will effectively connect the sensitive line to all systems, until a complete standardization of all these telephone systems shall occur.

This leads to the question, what is a complete standardized system, and when can all systems be expected to attain to this desirable state? To attain this end, does it mean that all apparatus must be manufactured by the same company? No! Every company can manufacture standard drops, ringers and generators. It means that a standardized system is one that will operate in direct connection with the standard toll line track, without unbalance, and without the least impairment to transmission. Such a system, if it be local battery, to attain to standardization, must have balanced metallic lines, 1,600 ohm bridging bells, 1,000 ohm clearing out drops, and open circuit generators. The absence of series connections should be conspicuous. If it is necessary to connect a grounded line to this standard system, it must be connected by means of a suitable repeating coil. As to a standard repeating coil, one that will meet every condition alike is impossible. There is more difference in repeating coils than any other telephone apparatus. One that is designed so that thirty bridged grounded parties may be rung through its windings, is necessarily not as efficient for transmission as a coil designed to ring one party through its windings. Not one condition favors thirty, or forty party lies from the electrical standpoint.

A standard common battery system would be one that furnishes the subscriber's instrument with about fifty volts during his connection with the standard toll line track. This connection medium is a repeating coil. As there is no ringing generator current to pass through this coil winding, it can therefore be designed for transmission alone. It will therefore be of small size, having a small amount of iron, and low resistance windings. That common battery repeating coils have low resistance windings, of equal dimension on what may be called the primary and secondary winding is unfortunately true. It is unfortunate for this reason, that the electromotive force of the talking current of common battery is very low, let us say from two to five volts. If such is the case, what can be expected from a long distance common battery connection? What could be expected from a local battery connection, if the primary and secondary winding were the same? We could not talk very far with much efficiency. And a common battery connection with long distance is in bad repute, and may possibly deserve it. So some of the exchange managers maintain local battery telephone booths for long distance conversation. It is bad practice, though necessary at times. The local battery induction coil raises the primary voltage of three to five volts to hundreds in the secondary, thereby overcoming long line resistance much more effectually, and thereby gives transmission to great distances. If the common battery repeating coil has step-up windings, the high resistance winding on the secondary, or toll line side, then any common battery system may be standard whatever the voltage of the system. One telephone engineer, in a plea for standardization, said that good long distance service could not be given by a forty volt system of common battery. If such were a fact of experience, there must be a local condition involved, possibly inferior transmitters, and wrongly designed repeating coils. Fortunately, ten, twenty, thirty, or forty volts will give equal results, if a repeating coil will compensate for the difference of voltage.

Long distance service has caused the cry for standardization. The American Telegraph and Telephone Company has heeded the cry, and is bending great energies toward this desirable state. The Independents must also heed the cry. Long distance service is the battleground of to-day, and future superiority depends upon the victory of to-day. Local conditions have been successfully fought. Manufacturer and operator alike must turn away from local conditions, and look toward the neglected fields of long distance service. Toll lines offer opportunities for revenue that local lines do not. What operator would refuse to lease each side of his toll line for telegraph purposes at $15 or $20 a year mile, and still retain the integrity of the telephone privileges? There is vast business along these lines awaiting proper development. And how many operators know how to accomplish this result, and to what manufacturer can they look for standard information and standard apparatus? These ends must be gathered together, as telephone companies cannot afford to throw away valuable biproducts.

A satisfactory standardization is only to be attained when each and every telephone operator can have the means of finding out what apparatus is standard. The only institutions that have the power to name the standards are the various State, Interstate and National associations. Let the Interstate take the initiative and name a standardization committee, composed of competent engineers, and employ them to make tests, and report the results at the next convention, or to encourage the annual meeting of the engineers and traffic managers of the operating companies, the consulting engineers, and engineers of the manufacturing companies, under the auspices of, and at the time of the Interstate Convention with plenty of time for papers, reports of tests, discussions and expressions of opinion. I believe that this one thing would do more to bring order out of chaos to establish uniformity of long distance service and to bring about a general standardization than any other process. The hope of standardization lies with the engineers. Let them gather together, and my claims will be proven.

A FOUR PARTY ANECDOTE.

RECENTLY in a New England town the telephone company inaugurated a four party service and had for its four designation letters, A, B, N and L. The editor of the local paper relates what happened thusly:

"The new telephone system of calling subscribers went into effect yesterday morning and for a time after the girls got busy answering the calls and correcting people who insisted on using the old numbers there was almost a strike. One of the operators, it is said, threatened to resign unless she was treated with courtesy by the horrid man on the other end of the line.

"'What number?' she asked, in her sweetest Sunday vioce.

"'Give me 931 Hell,' came the startling answer.

"'Sir!'

"'Give me 931 Hell!'

"'We have no connection with that place, sir,' replied the operator, as she shut off the caller abruptly.

Again he rang up. 'Give me 931 Hell, if you please,' and there was decided emphasis on the last word.

"'I told you we were not connected with that place,' flashed back the operator.

"'Well, it's in the book, ain't it?' he said.

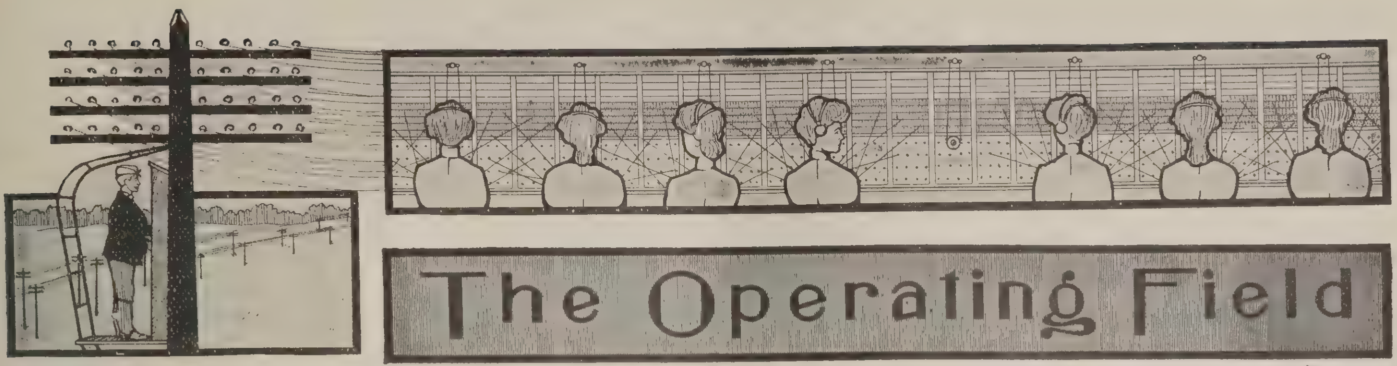
"'What book?'

"'Why, the telephone book, I want Mr.——, 931 Hell—Haich, Hi, Jay, Kay, HELL—931 Hell. Ain't that right?'

"'I beg your pardon,' said the operator. 'You want 931L. Is that it?'

"'Yes, that's it—931 Hell; that's what I said in the first place."

Our opinion is, that L was a remarkably well selected letter—for a letter on a four party line, especially in a town with an English citizen who insists on dropping and inserting H's in such unfortunate places. Anyway, he described about what four party service is.



The Operating Field

OHIO TRAFFIC COMPANY MEETS.

At a meeting held in Columbus, Ohio, recently, the question of removing the headquarters of the Independent Telephone Traffic Company from Cleveland to Columbus was discussed by representatives of the twenty Independent telephone companies of Ohio which belong to the traffic company. Managers of telephone companies from Columbus, Lorain, Vermillion, Portsmouth, and of companies of the United States and Federal Telephone companies were present, and adjourned without taking definite action to meet again in Cincinnati the second week in February. Walter B. Green, of Cleveland, manager of the Traffic Company, represented the Cuyahoga Telephone Company at the meeting and led the fight for the retention of the headquarters in Cleveland, where offices are now located in the Electric Building.

The Citizens' Telephone Company, of Columbus, was strong in its advocacy of the removal of headquarters to that city, and the Columbus people were supported by many of the representatives of Southern Ohio companies. The Traffic Company was organized to bring about a number of improvements in telephone management, particularly the bringing about of closer bonds of union between the Independent companies of the State. At present, however, its main work consists of buying telephone supplies for the twenty companies, thus securing the supplies in large quantities and at lower rates than would otherwise be possible. It was because of this feature that the fight for a removal of the headquarters was brought about, the Southern and Central Ohio members of the company desiring the headquarters in a city centrally located. The representatives of the co-operative companies also discussed plans for promoting the establishment of a bad debt bureau and other features of the work of the company which were proposed at its organization, but which have never been developed. It is also probable that efforts will be made to bring all the Independent companies of the State into the organization and make it more powerful than it is at present.

NEW CONNECTIONS FOR ROCKFORD, ILL., CO.

Connections have recently been made by the Home Telephone Company, of Rockford, Ill., with nearly three hundred country telephones in the territory east and northeast of Rockford. The Boone County Company has been connected with and now communication can be had with Capron, Caledonia, Poplar Grove, Belvidere and other cities in that vicinity. It makes direct connection with a great number of farmers in the section and through the same source a roundabout connection can be had with a great number of other points that can be reached in no other way. At a meeting of the managers of the Independent companies, held at Rochelle the 18th of the month, Manager Gibboney, of the Rockford company, was elected secretary of the organization in which all the companies in the northern part of the State are represented. The heads of the companies will meet together often to talk over the work and advancement of the Independent companies and will work for their betterment. Through the recent connection the Rockford company can have connection with many new telephones. In Ogle County 2,100 telephones were connected with the local line. While the number of telephones outside of the city have been doubling the connections in the city have been growing and now there are over seventeen hundred local instruments in service.

BELL WILL NOT APPEAL WESTERN UNION SUIT.

The American Telephone and Telegraph Company has decided not to ask for a rehearing before the United States Court of Appeals in the Western Union-Bell Telephone royalty case which was decided in favor of the plaintiff October 7th last. Counsel for the American Telephone Company notified counsel of the Western Union Telegraph Company to this effect Wednesday. It appears that the American Telephone Company was given 30 days in which to petition for a rehearing, which was extended by consent of the plaintiff to December 4th. The next step in the case will be the appointment of an auditor by the court to determine the payment to be made by the American Telephone Company, or a petition for a writ of certiorari for a trial before the Supreme Court.

TEXAS INDEPENDENTS TO ORGANIZE.

It is intended to call a meeting of the managers of the several Independent telephone companies of Texas. The meeting is to be held in Fort Worth. At it important action will be taken to further the Independent telephone interests of the State. The object of the meeting is to consolidate the long distance telephone trunk lines in order to reach Fort Worth from the many outside points which have Independent exchanges or lines, and it will mean the new company can cover a large portion of Texas territory from the Fort Worth office.

KANSAS CITY COMPANY HAS 9,000 CONTRACTS.

Directors of the Home Telephone Company, of Kansas City, Mo., met recently, the principal object of the meeting being to arrange for the employees necessary to operate the plant and to give the out-of-town members of the board of directors an opportunity to inspect the work of construction. The company expects to have 6,500 telephones in operation by January 1. The directors now claim to have 9,000 contracts already signed and think that by April 1 they will have 10,000 in operation. The out-of-town directors who attended the meeting of the board were: Henry Koehler, Jr., Lee Benoist, A. W. Lambert, St. Louis; Ed. L. Barber, Wauseon, O.; J. S. Brailey, Jr., Toledo; Arnold Kahlman, St. Paul. During the afternoon of the meeting day they were taken on a tour of inspection of the construction work that has been completed and that is now in progress.

The company will move to its own building in Baltimore avenue in about a month. At the meeting the directors found that it would take about 250 employees to operate the system. The East Exchange Building has been finished. At Peery and Bellefontaine avenues the switchboards are now being put in. It was also given out that the Western Independent Company, which represents the long distance lines of the Home Company, had increased its capital stock from $20,000 to $1,500,000. Henry Koehler, president of the Germania Trust Company, of St. Louis, said it took his company but five days to write the $1,500,000 bonds, which he considered remarkable. The long distance lines of the company cover all the eastern part of Kansas and the western part of Missouri.

The Editor's Page.

THE INTER-STATE INDEPENDENT CONVENTION.

THE AMERICAN TELEPHONE JOURNAL of last week stated that the forthcoming convention of the Inter-State Independent Telephone Association would bring together one of the largest and most notable gatherings in the history of telephony. The convention itself, which closed its labors Thursday afternoon, fully justified these enthusiastic anticipations. The beautiful banquet room on the sixth floor of the Auditorium had been placed at the disposal of the association and it was well filled at each session. Not only were the nine States comprising the territory covered by the association ably represented, but from the East, South and West, telephone men had gathered, drawn by the growing fame of the Inter-State Association and by the practical nature of the subjects to be discussed.

One could not help being impressed with the men who made up this convention. Wideawake and clean men they were, substantial men of affairs, keen and alert pioneers in Independent telephony. To them had fallen the task of wresting the country from the grasp of a merciless monopoly. The splendid and effective manner in which this is being accomplished can receive no better illustration than this same convention.

The convention, the third in the history of the association, was not only greatest of the three and most representative, it was an improvement in several respects. The manufacturers were there in force after business, with their goods on exhibition and a small army of representatives to expatiate on their merits, but they were an adjunct rather than a vital part of the convention. The association stood on its own feet, paid its own way, did its own entertaining; in short, carved out the meeting in a most happy manner along strictly Independent lines.

This fact alone indicates that the Inter-State Association has entered upon a new period in its development, a period which augurs well for the future. It seems almost necessary that all similar bodies should pass through what may be called an experimental period, before their real mission can be accomplished. This has been true of the Inter-State Association. Not that much has not been accomplished in the past. But the atmosphere that surrounded the proceedings this week indicated beyond question that the association has entered the practical stage in its very promising and notably eventful development.

"Standardization of Apparatus," "Standardization of Construction," "Competition with Farmers' Mutuals," "Where Should the Line be Drawn between Independents and the Bell Company?" These are practical subjects which come home to the every-day business life of the Independent operator, and these and such as these are the subjects which drew a large number of telephone men, not included in the list of membership. These are questions, which must be answered, and answered right, to the satisfaction of all, during the next few years that are to come.

A NEW PERIOD OF ACTIVE DEVELOPMENT.

An outsider, unfamiliar with telephone details, would have been impressed with the enormous expansion of Independent telephony during the past few years, as indicated both by the representation in the convention and the discussions upon the floor. Even an experienced telephone man finds it difficult to fully realize this development until confronted with visual and indisputable proof like that of this week's convention. And the question may well be asked wonderingly, Where is this going to end? Are the Independent operators fully alive to the great future of telephony and ready to grapple with its problems? Are they fully alive to the need for standardization and co-operative methods? Yet, the questions are answered as soon as asked by the convention itself, and answered affirmatively. Those earnest men are not men to trifle with conditions. They may be trusted with the future.

The most significant fact brought out by the deliberations, although, of course, understood in a general way, is the enormous development in the long distance Independent lines, which has taken place almost entirely since the organization of the Inter-State Association. True, these long distance lines are confined to particular States—Ohio, Indiana, Michigan, Kentucky, Missouri—but these Independent systems are now reaching a stage where they can be profitably connected under some adequate traffic arrangement, and they are being so connected. Already it is possible to talk from St. Louis to Louisville over Independent lines, and, as one speaker indicated, it is only a matter of a year or two when the Independent companies will be able to point to a long distance system, equal in extent and superior in service, to that which the Bell Company has so long monopolized.

The convention, in addition to the practical and helpful ideas suggested by the papers and discussions, cleared the atmosphere in other ways. Notably so, in regard to the plans of the company which is installing an Independent system in Chicago. The Independent exchanges need this great market and Chicago needs them. Altogether the convention is one for which the association is to be congratulated, and the association has proved itself one for which the country may be congratulated. For the development of telephony must keep pace with the great commercial development of the nation and the association is now where it can work most effectively in this direction. With its enlarged territory and scope the Inter-State Independent Telephone Association has a great future.

STANDARDIZATION OF CONSTRUCTION*

By W. C. Polk.

W. C. POLK.

I TAKE it that the subject, "Standardization of Construction," may be interpreted to mean not so much as to what shall constitute Standard construction, but as to whether construction should be standardized and how such standardization can be brought about and made effective.

As to the first proposition, "What should constitute standard construction?" we will not attempt to answer, for the reason that I believe no one person is capable of, nor should presume to tell this Convention of what Standard Construction shall consist. Not that we do not have among us capable engineers and construction superintendents, but that all of us in our experiences and operations have been confined to more or less local fields with comparatively short periods of observation under various conditions. For these reasons we are incompetent to propose methods which shall be the standard and guide of us all, and be applied upon all occasions, circumstances and condtions under which a company may be operating.

The conditions under which the numerous telephone companies have been organized and are operating are so varied that I feel safe in asserting that it is an impossibility for anyone to formulate a set of specifications or plan of construction which would be applicable in all cases and in accordance with which all companies could practically and successfully operate. Someone says it is not necessary that these specifications and plans be made up in detail, but only cover certain general facts or principles which would apply in all cases and which if conformed to would be practical and result in universal benefit.

All right, we will start with an article which enters into and forms the foundation of construction of all modern plants in the majority of cities having a population of 35,000 and upwards:—Underground Conduit.

There is the single duct, multiple duct, clay conduit, iron pipe, cement line pipe, cement conduit, paper conduit, creosote wood, etc., all of various sizes and shapes, laid in a variety of ways; all in use and all giving satisfaction to the parties using them. Which shall be Standard, and how shall it be laid? Here are the manufacturers, each telling us his is the best, cheapest, most durable. We cannot use them all and at the same time have an effective standard. I am sure if we adopted one of the above as a Standard and proceeded to utilize it as such, it would not remain the cheapest very long.

Go to the next article, which enters into the construction of all plants, whether large or small, modern or antiquated:—Poles. Shall they be cedar or chestnut? White cedar or red cedar? Northern cedar or western cedar? Cypress or tamarack? Shall they have four inch tops or five? Six or seven? Eight or nine? Or even greater? What height shall they be, twenty feet or sixty? I can conceive of circumstances and conditions under which any of the above would be applicable. Which, then, shall be made Standard and adhered to upon all occasions?

Now, as regards Wire: (Which, until Mr. Marconi gets a little further advanced, is a necessary adjunct to all telephone systems.) There is iron and copper, both of varying gauges. Neither can be made the Standard at present, for there are conditions under which either may be judiciously and successfully used, both with various gauges within certain limits.

There is Cable! Of what sized wire shall it consist? What insulation? What capacity? What character of sheath? We cannot specify to which of the many qualifications it shall conform and say it must be universally used. I remember visiting a town a short time ago of less than 10,000 inhabitants and the manager taking pride in telling me he had an underground cable system; cable up to conference specifications and all that. This system extended about four or five hundred feet from the office; cable of No. 19 gauge wire 0.08 capacity, 500 megohm insulation. The specifications were good if the cable had the qualities enumerated, and should be required in certain cases, but in the particular instance cited the manufacturer simply used these qualifications for an excuse for charging an exorbitant price for his goods. Cable of 22 gauge wire, 0.12 capacity would have served just as well and operated as satisfactorily, and cost less money.

We could go on through the list of construction material, such as cross-arms, cable-boxes, terminals, protectors, hardware, etc., and meet with the same situation and reach similar conclusions to those outlined. In view of the above facts, it is certainly clear that it would not be safe or wise to say, at the present time at least, as to what shall constitute Standard construction.

Going to the next proposition,—as to whether Construction should be Standardized? Certainly, if it is practical and possible to do so. Under present conditions I do not believe that it is either possible or practical to have a standard of construction in the Independent telephone field. The primary reason for this belief lies in the fact of there being such a large number of separate and distinct organizations constructing and operating; each with its individual and personal ideas which it insists upon following, regardless of results for good or evil thereby inflicted upon its neighbor; also the fact of the large number of manufacturers and supply houses from whom it is possible to purchase material and equipment, precludes the possibility of an early standardization. All of these manufacturers produce certain articles which are good and which any operating company could wisely purchase. As a large number of these manufacturers produce articles of the same character and for the same purpose but of a different type, the possibility of standardizing them is prevented, for the present at least. Also, owing to the recent developing of the business, Independent telephony is in its evolutionary stage. New ideas and inventions are being brought forth, we might say almost daily, which prove to be improvements over previous materials used.

We should not, therefore, retard the progress of these improvements for the sake of keeping to a standard. Whenever we reach a time when this evolution seems to have reached its zenith, if it is possible for the condition ever to rise, this will be the opportune moment for standardization.

Another fact which stands out very prominently before us all, is the conditions of our adversary, the Bell company. It is operated as nearly as it is practicable to do so by one dominant power. It purchases its equipment and supplies practically from one and the same source; yet we all know from observation that it has been unable as yet to reach any satisfactory stage in standardizing its equipment or methods of construction. Travel over its territory and you will find equipment of various kinds and types and all character of construction.

I realize that although the Bell Telephone Company may have failed up to the present time to reach the goal, it does not prove that the Independent companies could not do so. We are aware, all of us, that the Independent companies have been able to accomplish and bring about improvements that our adversaries either could not or did not accomplish; yet the fact of their failure to accomplish the result which we know they have been endeavoring to attain—that is, standardize their equipment and establish uniformity in methods of construction, indicates that we have a very formidable barrier to overcome.

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* Paper read at the convention of the Inter-State Independent Telephone Association, Chicago, Ill., Dec. 9th, 1903. Mr. Polk is engineer for the Central Construction Company, of Toledo, Ohio.

Although it appears that the time is not ripe for our complete success, the question arises, "What can be done to make our progress more rapid, that we may reach our aims as quickly as possible?" At the present time, there is no doubt, large sums of money are wasted on account of the lack of uniformity. We see companies being constructed and operated under conditions as favorable for one as the other, yet one is more successful than the other. Usually the causes which bring better results for one than for the other can be traced to its method and character of construction. In fact, failures, due to faulty construction, have been narrowly averted. It therefore seems that although we may not be able to bring about uniformity, we should begin to formulate plans that would enable and prevent our weaker brethren from coming so near to failure and bankruptcy.

Another feature which makes it very important for us to have some general methods, is on account of the necessity of enlisting new capital in the field. A promoter obtains a franchise and completes all the necessary preliminaries for beginning the construction of a plant. The conditions are all good, and if the proposition is properly managed there is no doubt of the venture proving successful. The promoter goes before the capitalist with his prospectus. The capitalist is very favorably impressed, but before taking final action he calls upon the engineer to make a technical report. This engineer possibly may have had large experience, but in a limited territory under certain conditions. The conditions in the prospective new field may be extremely favorable, but entirely different from those with which he is familiar, and would call for entirely different modes of construction from those with which he is familiar. The result is he applies his methods to the new fields and makes a very bad showing. The capitalist turns down the proposition. This is a state of affairs which is wholly wrong and unfortunately very often happens.

It seems to me that if we had some national organization or board, composed of experienced and practical telephone engineers and construction superintendents, made up from representatives from all parts of the country, familiar with all the conditions and operating features in their various localities, to whom financial men and investors could call upon for advice, results would be more satisfactory. This organization necessarily could not act as a body in all of these cases. However, it could have a standing committee whose personnel would be of its best and most experienced men; these men to be broad and liberal in their views.

These parties should keep an eye upon the new propositions coming up in their respective territory. The operating owners and managers in these various sections or territories to be kept advised of this active representative of the national organization in their territory; acquaint them with the fact that they could feel at liberty at any time to call upon this member for advice. This member, in matters to which his attention is called, to only act personally in trivial or unimportant cases. All important matters brought to his attention to be referred to the general committee, and especially all new propositions or large ones calling for new and large investments. In this way the new investor, or new operator, would have a means of knowing where he could turn at any time for advice which would be conscientiously and intelligently furnished. By this means, we would eradicate that most persistent evil standing in the way of successful and rapid progress of Independent telephony at the present time—individual personality. The successful issue of a proposition to-day depends too much upon the personality of one individual, who persists in carrying out his own personal ideas regardless of the judgment or advice of associates.

You will probably say, "What if the new promoter does not turn to your committee, and if not, what means has your national board or committee of asserting itself?" It can do this: If the new organizer or promoter called upon outside sources and his prospective investor was incompetently or illy advised, your committee's active representative would immediately bring the matter to the national body's attention, and its national officers could take the matter in hand and take it upon themselves to see that the proper parties were properly advised; and by intelligent and dignified procedure show wherein, from whom and in what manner the ill advice had been given. It would not be long, I believe, until irresponsible and incompetent individuals would lose their prestige; especially in operations of any magnitude.

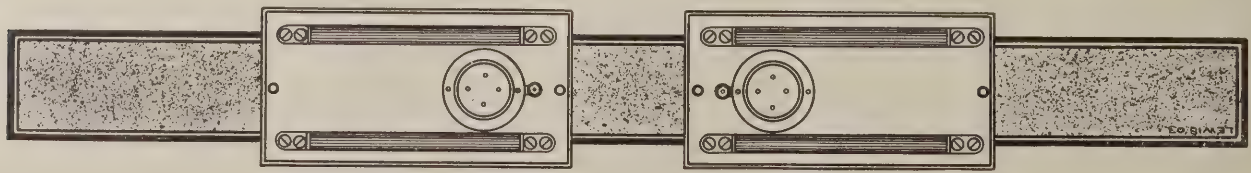
I realize that we are deviating somewhat from the course indicated by our subject. Nevertheless, I believe you will agree with me in the impracticability of accomplishing the results contemplated by our subject, for the present at least, and at the same time agreeing that such results ought to be accomplished. In the meantime, we should be doing something to help bring about the desired end whenever the opportune moment does arrive. It therefore occurs to me that what we should work for at present is to eliminate personality and strife between ourselves and get the better results which are bound to come from united or combined action.

The question then presents itself, "How shall we get this united action, or results which shall be the best we all can furnish?" This I believe can be done something after the plan I have indicated. It possibly will take time, perseverence and considerable labor on someone's part to put the machinery in motion. The officers of our various associations and trade publications could work it out and in time have the machine in successful operation.

In order to obtain membership in this national organization, candidates should be very carefully chosen, and entrance to it very closely guarded; only persons of certain minimum number of years of actual experience in practical construction and maintenance of telephone properties should be chosen. Its membership should predominate with practical engineers and superintendents of construction, and not with owners and investors. These men to be chosen on account of their broad experience, broad views, and strong personalities, who could be relied upon to give proper advice without fear or favor. The expense of the maintenance of such an organization should not be great and could be maintained by the various telephone associations. I believe the results that would be obtained from the operation of such an organization or bureau would do more toward bringing about standard methods of constructing and operating telephone properties than anything else that could be done at the present stage of development.

The problem which confronts the present construction engineer with most frequency is that he is called upon to construct a plant complete; required to accomplish certain fixed results and put the system upon an operating basis for a specified amount. A large number of items of cost of promotion and organization over which he has no control are incurred, and as these increase the amount allowed for construction is decreased. Then arises the necessity not of following standards and specifications but of using judgment as to the best that can be accomplished for the means available.

Therefore, good construction at the present time is not so much an attribute of following fixed standards and plans as it is the result of individual personality of being able to meet the local conditions in the best possible manner, using the best materials directly at hand and keeping well within the amount of means available.



COMPETITION BETWEEN INDEPENDENT TELEPHONE COMPANIES AND FARMERS' MUTUALS*

By O. Rex.

THE development of the telephone business has been, in the past few years, phenomenal. With such gigantic strides has the business enlarged and advanced that the commercial world has never seen such progress. It has developed with such rapidity that very few have comprehended the vast amount of capital already invested or the future possibilities. The local manager of the Independent telephone company is a busy man. In the past he has not had the time, or has not taken the time, to consider the far-reaching possibilities of his art. He now finds himself, in many cases, facing two dangers: First, the Bell Company with all of its experience and queer ways, and second, the farmers' mutual companies. These are the two elements of danger that the Independent telephone companies must meet. Company condition we fight. That goes without saying. The farmers' mutuals we must do something with. In some localities we have almost lost sight of the Bell Company. We must not think, however, that it has left the field. It is still in evidence From signs the Bell Company is apparently exercising a dangerous influence through one of the manufacturers.

O. REX.

I have a personal knowledge of one case where the representative of one of the leading manufacturing companies devoted two weeks of his company's time promoting an exchange in opposition to one of the pioneer Independent companies in Indiana. When the agent was urged by the manager of the old company not to encourage another company in the same town, he made reply by saying that his factory was making goods to sell, and he could sell them their equipment at a much better profit than he could sell to the old company. We also find the agents of the Bell Company organizing the farmers, and offering them very low rates as an inducement to connect with its lines and it sometimes succeeds in getting them. Now the farmers throughout this country are demanding telephone service, and in most cases will have it, and necessarily must have connection with the towns in which they do their trading. The question is, how are we to handle this problem without loss to the local company? The local exchange manager cannot build lines to them in many cases, because his capital is busy keeping up town service, and in other cases the revenue derived therefrom is not considered sufficient to make the investment a profitable one. The solution of the problem is up to us all, and especially to those of us that are operating exchanges in the smaller towns and cities.

I beg to suggest a mode of taking care of the farmers, and which to my mind is a safe one. Encourage the organization of farmer companies, and put yourself on friendly terms with them, give them the help that you are able to give from your knowledge of the telephone business, and thereby enable them to construct their lines and install their equipment in a manner that will give a satisfactory service to themselves and the exchange with which they are connected. The farmers throughout the land are demanding and will have telephones and they are, as a rule, willing to put their money into the construction of rural lines, and by your friendly attitude towards them you can in most cases make arrangement for exchange service that will pay operating expenses and sometimes a profit, but if it only pays the necessary extra operator it would be better for the exchange than allow them to fight their way into the town and ever after be your enemy.

Hoping that this brief paper will lead to a free discussion of the subject by the delegates present, and that we may be able to decide on some plan that will conform with the best interests of the exchange owners, and also with those of the farmers, and that energy that is now spent in strife will be expended to further the interests of all parties concerned.

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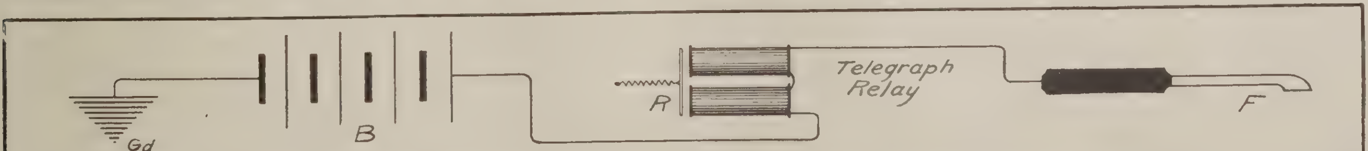
* Paper read before the Inter-State Telephone Association, in Chicago, December 9, 1903. Mr. Rex is president of the North Manchester Telephone Company, North Manchester, Indiana.

A SIMPLE GROUND TEST.

By Chas. Amber.

IN small exchanges that possess no slide wire or Wheatstone bridge, some simple form of a test, whereby a ground can be located will be found convenient. The apparatus shown in the figure is simple and as has been proved by experience is thoroughly practicable. It will be found not only useful in small exchanges but also in those with a capacity of several hundred subscribers. It can be very frequently used as a rough test. In the figure, *F* represents a feeler made with whatever the maker of the apparatus happens to have at hand. An old contact spring of some sort will generally serve the purpose quite well. *R* is a telegraph relay of 150 ohms resistance. *B* is a battery of 15 to 20 Leclanche cells. Now after a thunder storm if it is desired to find out which lines are grounded, by running the feeler *F* over the springs on the main frame or distributing board the ground may be easily located, for when the feeler comes in contact with the grounded line or a grounded carbon, the relay will click and the inspector can make further investigation and clear the trouble. In common battery exchanges where one side of the line is grounded until the operator goes in on that line with her answering plug the scheme would not be found practicable because the line would always test grounded except when it was in use.



THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

REMEDY AGAINST DELINQUENT SUBSCRIBER.

A SUBSCRIBER refuses to pay his bill, claiming that we are indebted to him for coal, which we deny. We have taken out his telephone and refuse to put it back until he pays his bill. He threatens action against us for not furnishing him service. Can he sue us? J. A. H.

THE subscriber can sue you, but would not be entitled to recover a judgment against you. In most states it is the company's duty to furnish efficient service to everyone without discrimination. A rule that such service must be paid for in advance, and, if not paid for, your instruments will be removed, is reasonable, and one that you have the right to enforce. Teleg. Co. v. McGuire, 104 Ind. 130, 2 N. E. 201; Water Co. v. Wolfe (Tenn.), 41 S. W. 1040; Frothingham v. Benson, 44 N. Y. Supp. 879; Brass v. Rathbone, 153 N. Y. 435, 47 N. E. 905. Keeping in view the nature of the company's duties and the services it may be compelled to render, it has been held that the court may enforce the payment of its current dues by the summary method of denying service regardless of the fact that the subscriber claims the company is indebted to him. Rushville Co-op. Teleph. Co. v. Irvin (Ind.), 59 N. E. 327.

INDIVIDUALS MAY COMPETE.

A LAW of our state prohibits telephone companies organized under a certain incorporation act from establishing a line in competition with an existing or authorized line without the consent of such existing company. Would that prohibit an individual from building and operating a line without permission of the old company? E. M. M.

SUCH a law, being restrictive of competition, would be strictly construed. If the individual was not incorporated, we believe he could not be included within the prohibition of the statute. Haines v. Crosby (Me.), 47 A. 137.

MICHIGAN TELEPHONE COMPANY SALE.

THERE is a distinction between the suits begun by Charles Flowers and the three trustees to set aside the sale of the Michigan Telephone Company's property and the action inaugurated by Mr. Harriman of Boston in connection with the same matter. The former suits are merely for permission to intervene in the foreclosure proceedings of the Old Colony Trust Company with the ultimate purpose of setting aside the sale and either holding a new sale or leaving the company under the receivership of the Union Trust Company. The petitioners accept the decree of foreclosure and the receivership, attacking only the sale. They assert in their petition that there are 700 stockholders in the State of Michigan, representing $700,000 of the capital, and that they have no representation on the board of directors. They further claim that the first default in the payment of interest on the company's bonds, made July 1, 1902, was fraudulent and a gross wrong on the stockholders.

In support of this proposition they show that in the annual report for the year 1902, $394,521 was charged up as interest when that interest was not paid. They also allege that the company was solvent at the time of the foreclosure of the mortgage and amply able to pay its interest and meet all debts. The petition further asserts that the company is now earning a sufficient revenue to pay 5 per cent. on its bonds and stock, $100,000 for operating expenses and $300,000 for maintenance. Fully 75 per cent. of the property is new. The bill also recites that through the foreclosure sale the benefit accruing from a favorable contract with the Bell Company has been eliminated, and that the property is now practically at the mercy of the parent corporation. It is also alleged that the Bell Company is seeking to secure a larger revenue from rentals and royalties than has hitherto been received.

The petitioners further assert that they believe it to be the intention of the gentlemen representing the bondholders and the purchasers to reorganize the company with a large capital, greatly in excess of the amount for which it was purchased, and to carry out a scheme for the promotion of a company on a large scale, which shall completely wipe out the minority stockholders and transfer their property rights to themselves without consideration. At the hearing last week, the Old Colony Trust Company explicitly denied all allegation of collusion and asserted that all the bondholders wanted was their money. No decision has yet been made.

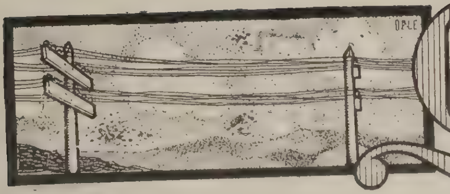
The Harriman suit, on the other hand, is an original proceeding and seeks to set aside even the decree of foreclosure. The petitioner demands an accounting for the last five years and asks to have a new receiver appointed. Mr. Harriman's attorney relies on a similar case recently decided in Massachusetts, entitled George W. Pepper, Receiver, v. the Boston Gas Light Company, to be reported in the *Northeastern Reporter*. The same charges were there made as are made in Mr. Harriman's petition. In that case a number of gas companies in New England were consolidated, and then, it was alleged, the property was deliberately wrecked and thrown into the hands of a receiver. A decree of foreclosure was secured and the plant sold for default in payment of interest on bonds, thus wiping out the stockholders and giving the wreckers possession on easy terms. One year after the sale had been confirmed, Mr. Pepper, who had been receiver of one of the constituent companies, went into court with charges of fraud, and the sale was set aside.

SETTLED OUT OF COURT.

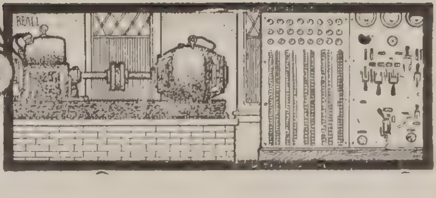
THE litigation between the Telephone Subscribers' Association, suing as James F. Manning, and the Chesapeake and Potomac Telephone Company, which has been pending in the courts of the District of Columbia for the last five years and which has also been taken on appeal to the Supreme Court of the United States by the company, has finally been settled out of court. A report of the last decision in the case was given in our issue of November 28th.

CANNOT CHARGE TOLLS WITHIN THE CITY.

ASSISTANT CORPORATION COUNSEL HOYNE, of Chicago, has advised the judiciary committee of the common council not to recommend for passage an ordinance before it providing that no person or corporation owning or operating a telephone system shall charge for service within the city limits. The reason given was that the company might contend that its contract rights had been impaired and that, therefore, the city's right to exact 3 per cent compensation might be lost. The opinion also asserted that "toll charges" within the city limits were unlawful and all subscribers who paid them might recover their money from the company.



QUERIES



Questions on any subject relating to the technical side of telephony will be answered in this column.

MAGNETO TELEPHONE CIRCUITS.—(247.)

Will you please give me through the columns of your paper diagrams of the circuits of the following telephones. The Ericsson Company's micro-telephone desk set, the No. 36 series magneto telephone of the American Electric Company, and also the series magneto desk set made by the same company. T. A. S.

The circuits that you ask for are shown on this page as follows: Fig. 247a is the circuit of the Ericsson Company's micro-telephone desk set. Fig. 247b is a circuit of the American Electric Telephone Company's No. 36 series magneto telephone. Fig. 247c is a circuit of the series magneto desk set made by the same company.

ABOUT MAGNETO GENERATORS.—(248.)

Please give me a simple way to put the wires to a lamp so that a small dynamo will light one lamp. Will a magneto light a lamp such as those used in telephone work? If so, give the circuit of the same and what speed it will have to go. L. S. V.

In order to light a lamp from a small dynamo it is only necessary to connect one terminal of the lamp to one terminal of the dynamo and the other terminal of the lamp to the other terminal of the dynamo. A magneto will light a telephone lamp and will probably burn it out. Most telephone lamps are constructed to operate upon 24 volts and 1/10 of an ampere. Ringing generators give about 80 volts and sometimes as much as half an ampere of current, and so would burn out the ordinary switchboard lamp. The circuit would be the same as given above. By turning the ringing generator slowly it would be possible to light a switchboard lamp without burning it out. The faster the generator was turned the more current it would give, consequently the proper speed would have to be found by experiment.

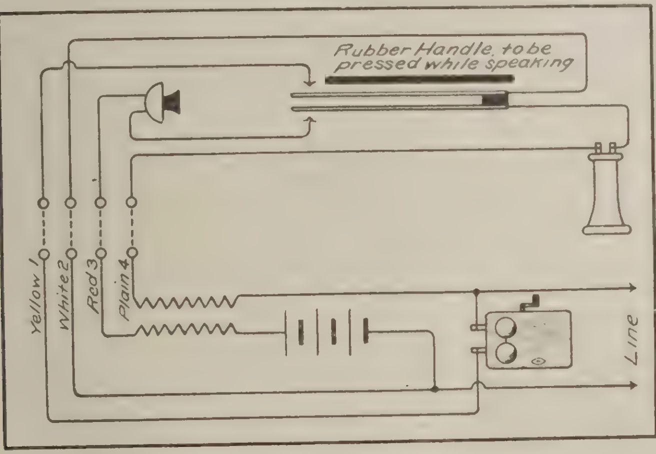


Fig. 247a.

IS TROUBLED WITH CROSS TALK.—(249.)

We have an exchange of about 300 subscribers (Magneto). Part of the lines are metallic circuit, but most are on a return system. We are bothered a great deal with cross talk and from induction at nights when the arc lights are turned on. Our return is of various size copper with some little No. 14 iron at ends of light leads as returns. Our main return is No. 8 copper and of course various side leads have a smaller size. The return is not grounded at the exchange or any other place except those caused by trees, etc. Now what I want to know is this: Can I kill the cross talk and induction without making our lines full metallic circuit? What is the proper size of copper, and would you advise copper wire, soldered to an old copper boiler, well grounded in the earth? F. R. N.

It is impossible to give you explicit directions that will enable you to clear the difficulty of cross talk and induction because the factors which enter into this problem depend upon local conditions which are impossible to allow for without inspection. In general, the common return should be uniform both in size and material throughout the entire exchange. It should be thoroughly insulated from all accidental or unintentional grounds, and preferably should not be run parallel to any other electrical circuits. All subscribers lines and apparatus should be thoroughly and carefully insulated and the attachments between lines of the common return should be carefully soldered joints. If a plant in the condition thus described has difficulty with induction or cross talk it is then a matter of experiment to find out where the trouble originates, and to prescribe specific remedies at the points where the trouble is found. In a general way, No. 8 copper wire is fairly sufficient so far as size is concerned. Large exchanges may be operated with smaller common returns than small ones. Sometimes grounding the common return at the exchange will improve the service. Sometimes it will not. This can only be ascertained by trying which is easy to do.

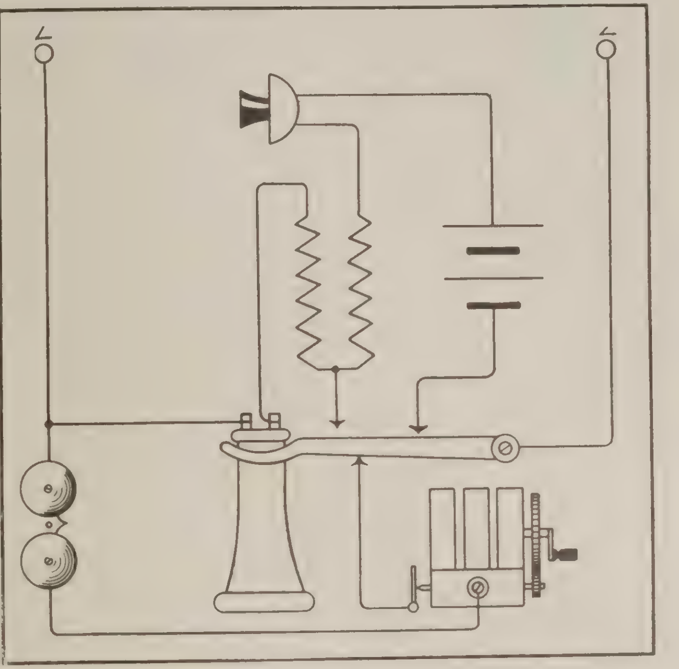


Fig. 247b.

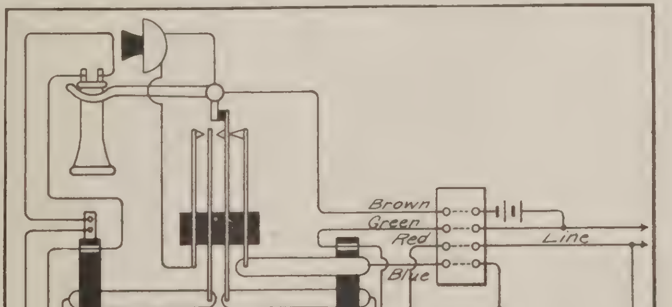


Fig. 247c.

The Week's Messages.

FINANCIAL

JACKSONVILLE, FLA.—The Jacksonville Telephone Company has purchased the systems of Jasper, Lake City and Live Oak.

PEKIN, ILL.—The Pekin Telephone Company has increased its capital stock from $10,000 to $75,000.

DENISON, IA.—The Crawford County Telephone Company, of Denison, has filed amended articles of incorporation increasing its capital stock from $50,0000 to $80,000. W. J. Scriber is president and J. F. Glenn, secretary.

BATTLE CREEK, MICH.—The stockholders of the Calhoun County Telephone Company held a meeting recently and declared a dividend for the six months ending with September 20th. The company expects to move into its new building soon and will continue the improvements that have been commenced.

MUSKEGAN, MICH.—The Oceana Telephone Company will increase its capital stock to $200,000, and has changed its name to the Lake Shore Telephone Company.

BATING HOLLOW, N. Y.—The Bating Hollow & Roanoke Telephone Company will increase its capital stock from $5,000 to $20,000. The increase will be used in further extensions of the line.

ERIE, PA.—The stockholders of the Mutual Telephone Company have voted to increase the capital stock from $75,000 to $150,000. The new issue of stock will be used for construction and additions.

STANTONVILLE, TENN.—The Stantonville Telephone Company has increased its capital stock from $3,000 to $10,000.

KENOSHA, WIS.—The Citizens Telephone and Telegraph Company has filed an amendment to its articles of incorporation changing the value of shares of stock from $25 to $100. M. H. Kavanagh is president and H. L. Fearling secretary of the company.

FRANCHISES

ASHKUM, ILL.—The Farmers Telephone Company has accepted the franchise recently granted by the city council and they will at once construct a local system.

EVANSTON, ILL.—David S. McMullen and W. Irving Osborne have given notice that they will present an ordinance for a franchise for a company represented by them to construct and operate a telephone system here. This makes the third application for an Independent Franchise.

MARSHALLTOWN, IA.—The city council has granted a franchise to the People's Mutual Telephone Company to construct a plant in this city.

SHEFFIELD, IA.—The People's Mutual Telephone Company has been granted a local franchise.

PATCHOGUE, L. I., N. Y.—The North Shore Telephone Company has been given permission by the commissioners of highways to construct and maintain its lines in this town.

PARIS, ME.—The Mount Micah Telephone Company, composed of farmers, mostly of Paris, has petitioned for a franchise through the village of Buckfield.

RICHMOND, MASS.—The Richmond Telephone Company has petitioned the board of aldermen to construct a line on the Richmond road.

LINDEN, N. J.—The council has granted a franchise to the Central New Jersey Telephone CSompany on its first and second readings. The ordinance has been presented by the Northeastern Telephone and Telegraph Company for farmers to erect poles for a line through the town.

RENSSELAER, N. Y.—The New York and Northern Telephone Company has petitioned the board of aldermen for a franchise to construct a telephone system in this town.

MADISONVILLE, O.—The Fitzsimmons Telephone Company has petitioned for a twenty-five years' franchise to construct and operate a system on the streets of this village.

JERMYN, PA.—Joseph Scheck and Andrew Mitchell, of Carbondale, and George S. Dunn, of Jermyn, representing the Anthracite Telephone Company, of this place, have appeared before the council of Forest City, requesting that the council reconsider its former action refusing to grant a franchise to the company. The council deferred action until another meeting.

COMBINATIONS

STREATOR, ILL.—The Streator Independent Telephone Company has purchased the lines of the Central Illinois Independent Telephone Company in La Salle and Livingstone Counties for $500.

BOONE, IA.—Manager Jones, of the Boone Manual Telephone Company, and Secretary Griswold, of the Hockeye Telephone Company, of Des Moines, were in Woodward recently for the purpose of purchasing the Woodward Telephone Exchange.

PELLA, IA.—W. H. Fowler, proprietor of the Fowler Telephone Company, of this place, has purchased the Jasper County Telephone Company, of Newton, Ia., including 26 miles of toll line, running from Monroe, Ia., to Evans. Ia.

RIVERTON, IA.—The Mutual Telephone Company has been organized here and has purchased the local plant owned by the Tabor City Telephone Company. The lines will be extended.

WEBSTER CITY, IA.—D. C. Chase, of this city, and a number of other local business men, are organizing a stock company for the purpose of taking over the lines and franchise of the Stratford Independent Telephone Company, and putting in a second telephone system and exchange in Webster City.

PUTNAM. TEX.—C. V. Marten has purchased the local telephone exchange from W. A. McCreight.

ELECTIONS

RUSHVILLE, IND.—The Co-Operative Telephone Company has elected the following directors: E. Price, Wm. Stanley, Wm. H. Nelson, J. T. Downey, Charles Cassady, Wm. Spencer, Wm. Jordan, I. F. Smith and E. A. Junken.

HOOSIC FALLS, N. Y.—The Eastern New York Telephone Company has elected the following directors: Watson M. Holmes, G. Frank Rising, Levi F. Worden, Lewis Haussler, Frank Reilly and Charles B. Story.

WILMINGTON, N. C.—The company which recently purchased the line of the Columbus Telephone Company, met recently at the law office of Russell & Gore and organized by the election of the following directors: F. A. Perry, of Chadbourn; D. I. Watson, of South Port; W. B. Cooper, B. F. Keith and S. F. Craig, of this city. The directors will organize soon and plans will then be prepared for putting the property of the company in first-class condition.

RICHWOOD, O.—The Richwood Telephone Company has elected J. E. Langstaff manager of the local exchange. Many new improvements and some additions are mapped out.

SAN ANTONIO, TEX.—The San Antonio Telephone Company has elected the following officers: H. M. Daugherty, Columbus, O., president; H. M. Aubrey, San Antonio, vice-president; D. A. Walker, Columbus, O., secretary and general manager; A. L. Beze, San Antonio, superintendent; Ferdinand Herff, Jr., San Antonio, treasurer. The future improvements were discussed and the matter of extensions was left to the board of directors.

HAMPTON, VA.—The stockholders of the Hampton Telephone Company have elected the following officers: W. T. Gentry, president; F. F. Montague, vice-president; D. I. Carson, secretary and treasurer. William H. Carter has been retained as manager.

THE WEEK'S MESSAGES—Concluded.

PERSONAL

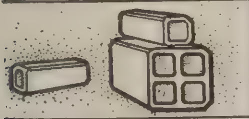
FRANK T. CRAVEN has resigned his position with the C. J. Field Conduit Company to represent the American Conduit Company, 170 Broadway, New York, Chicago, and California.

F. E. ROTCHKA, formerly sales manager of the Sterling Telephone Company, of Lafayette, Ind., has recently associated himself with the Stromberg-Carlson Telephone Manufacturing Co., and is now connected with the Chicago office.

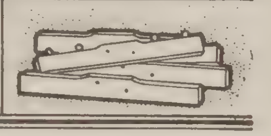
UNDERGROUND

LEAVENWORTH, KAN.—W. O. Pennell, superintendent of construction for the Missouri and Kansas Telephone Company, is planning for the construction of underground conduits for the company's wires in this city.

LEWISTON, ME.—The New England Telephone and Telegraph Company has been granted permission to lay its wires here underground.



New Construction in the Field



GLOBE, ARIZ.—William Whalley, manager of the Gila Valley and Globe Telephone Lines, is here completing arrangements for the extension of the Globe line to Livingstone.

COLQUITT, GA.—Col. Wade Powell, of Blakeley, is figuring on constructing his long distance line to this place. Most of the stock has been subscribed by residents along the line, and work will be begun January 1st.

DOWS, IA.—The James Telephone Company will construct a line east from town.

JAMISON, IA.—The Jamison Telephone Company will build a new line east from town to be known as the Inglebritson line.

LITTLEPORT, IA.—The Farmers Telephone Company will extend its lines from Littleport to Elkader.

PALMER, IA.—P. F. Tall is interested in constructing a rural telephone line to Pomeroy, Pocahontas and to the Lizard settlement.

MANY, LA.—The Northwestern Telephone Company has contracted with the Citizens Company, of Fort Jessup, to extend its lines to that place.

AUSTIN, MINN.—The Interstate Telephone & Telegraph Company, of this city, opened its exchange for regular service on December 1. It is an all cable plant, there being no cross arms or bare wire. Almost every pole is equipped with a small ingeniously designed terminal, so that pairs in the cable are available at almost every pole. A number of the pairs are in multiple, so if pairs which are not used on one pole can be used at another terminal, this makes the plant flexible and economical. The central office is equipped with a common battery multiple switchboard. The keyboard is equipped with indicating selective keys for selective party line work. The plant starts in operation with one telephone for every twelve inhabitants. The company expects to have a telephone for every eight inhabitants. The construction has been under the supervision of L. W. Stanton, of Cleveland, O.

CHARITON, MO.—A new telephone line is to be constructed from this place to Sedan, Iowa. The citizens of Sedan will then construct a line to Moulton, Iowa.

LA GRANGE, MO.—The Citizens Telephone Company is making many improvements on its exchange in La Grange.

KALISPELL, MONT.—John F. Moffitt, of Watertown, N. Y., president of the Kalispell Water and Electric Company, is here making an examination of the water, electric light and telephone systems. Mr. Moffitt is planning many additions and improvements to the plant. A new switchboard will be installed and all circuits will be made metallic.

DANBURY, NEB.—The Danbury Telephone Company proposes to extend a line to Red Willow, and from there to McCook.

SIDNEY, NEB.—Manager Lathrop of the local telephone company contemplates building a line to Potter and Kimball, where he will put in an exchange, and from there he will extend it to Gering and Harrisburg.

PIKE STATION, N. H.—The Pike Telephone Company has constructed a line from Center Haverhill to Benton.

VINELAND, N. J.—The Interstate Telephone Company, of Trenton, will have to rebuild its system here, at a cost of about $20,000.

FARMINGTON, N. M.—J. E. Elmer has returned from a trip to Largo, where he secured enough contracts for telephones to insure the building of a telephone line to that part of the country.

DARION, N. Y.—The assessment upon each share of stock has been made on the stockholders of the Darion Telephone Company for the purpose of completing the line. $800 have already been expended on the system.

FERNWOOD, N. Y.—Geo. H. White, Fred. B. Rich, Bert. D. Sheer, Sewell E. Gates and Dr. Fenton E. McCallum, of this place, and Frank W. White, of Pulaski, are discussing the advisability of organizing a telephone company for the purpose of constructing a system here. A meeting will be held in a few days to take definite steps.

GREENFIELD, N. Y.—The Greenfield Telephone Company is constructing a line from Porter's Corners to Middle Grove. An exchange will be established in the latter place.

RIVERSIDE, N. Y.—The Riverside Telephone Company is extending its lines to Unidilla. The Delaware Valley Telephone Company has extended its lines to Sidney to connect with the Riverside Company.

CHARLOTTE, N. C.—The Seaboard Air Line is making preparations to install a complete telephone system over its lines.

CONESTOGA, PA.—The Conestoga Telephone and Telegraph Company will construct a line from Joanna to White Bear and Geigertown. Further extensions will be made in the spring.

HOMEDALE, PA.—The lines of the Citizens Telephone Company here are being improved under the directions of F. W. Wells, of Scranton.

READING, PA.—The Consolidated Telephone Company proposes to construct a new line to Crumbsville, Stony Run, Albany, and other points.

ABERDEEN, S. D.—The Dakota Central Telephone Company has decided to expend $150,000 in extending and bettering its lines in South Dakota. Connections will be made with Mitchell, Madison, Sioux Falls, Pierre, Huron and Sioux City.

BELLS, TEX.—Home capital is figuring on organizing a company to construct a local telephone system to connect with the Grayson County long distance lines.

FAIRVIEW, UTAH.—The Fairview Telephone Company is making arrangements to branch out in the very near future.

SOUTH BEND, WASH.—Capt. Simpson is planning to construct a telephone line between South Bend and Long Beach. The distance is about fourteen miles.

BELMONT, W. VA.—The Belmont Telephone Company has decided to improve its service as a result of the substantial growth of its business.

IROQUOIS, S. D.—Farmers living near this place have arranged for the construction of a rural telephone line to connect with the Iroquois system.

PARKER, S. D.—The Farmers' Telephone line is constructing a rural line to Viborg.

WHITE LAKE, S. D.—Citizens of this place are arranging to construct a local telephone system.

BARRE, VT.—The school commissioners have decided to construct a private telephone system for the exclusive use of the schools in this town.

MARTINSVILLE, VA.—The Henry County Telephone Company of this place is constructing a line to Leatherwood. The line will then be extended to Axton. A great many other lines are also contemplated.

PULLMAN, WASH.—The Ewartsville Telephone Company, which is one of the oldest rural barbed wire lines in this section, is arranging to reconstruct its system in an up-to-date manner.

KINGWOOD, W. VA.—The Kingwood Telephone Company will reconstruct its lines from Kingwood to Grafton.

GREEN BAY, WIS.—The Wausauke Telephone Company is constructing a line from Brazean to Oconto Falls, and Gillett to Green Bay.

MADISON, WIS.—The Dane County Telephone Company has installed an additional section of its switchboard. The present switchboard is completely filled, and the new section will provide for an increase of 500 lines. The Madison exchange now has nearly 2,000 subscribers.

GORHAM, N. Y.—The Gorham Mutual Telephone Company is planning to add exclusively to its lines.

TUPPER LAKE, N. Y.—The Raquette River Telephone Company is constructing a line to connect Tupper Lake, Childwold, Gales, Seavys, Hollywood, Reynolds, Colton, South Colton and Pottsdam.

HUNTER, N. D.—The Hunter Telephone Company is constructing exchanges at Hunter and Grandon.

BERGHOLZ, OHIO.—The Bergholz Telephone Company is rapidly getting its Carrollton plant into working order. A number of telephones have been connected and the work is progressing rapidly. The exchange is under the management of Robert McLaughlin, of Scroggsfield.

GREENSBURG, PA.—A meeting of the stockholders and directors of the Federal Telephone Company was held here recently and it was decided to commence a great deal of new work in the near future.

TRADE NOTES

The Automatic Electric Company, of Chicago, has received an order from Bills Brothers for complete equipment of an automatic exchange of two thousand stations (initial installation) for Sioux City, Ia.

The Stromberg-Carlson Telephone Manufacturing Company, of Chicago and Rochester, has recently contracted with Leach & McArthur, of Chillicothe, Mo., for a 1,000 line visual signal generator call switchboard with 800 lines.

The Gordon Battery Company, of New York City, manufacturers of the well known Gordon cell, which is illustrated on another page of this issue, makes strong claims for the efficiency of its battery for telephone work. It is said to be especially suitable for central energy, switchboard transmitter and toll station work. Simplicity of construction, cleanliness, guaranteed long life and ease of charging are features of the cell. The company has a very neat little booklet describing the cells, which it is glad to send on request. Mr. Deems, the company's Western agent, represented it at the Interstate Convention.

The W. G. Nagel Electric Company, of Toledo, Ohio, is now putting on the market its "Ready" Telephone Memorandum Pad Holder. This holder is decidedly unique in design and extremely practical. It is made in three styles, for use on desk, to be fastened on the wall beside the telephone or to be fastened on the telephone proper. It is possible to insert memorandum pads or scrap paper in the holder with one hand. Each holder has a straight edge for tearing off memorandums. The holders for telephone use, have an adjustable arm which makes it possible to place at any angle. This holder is fully illustrated elsewhere in this issue.

The Pittsburg Sewer Pipe and Conduit Company, of Pittsburg, Kansas, has only been manufacturing clay goods since 1901, but in that time has built up an enviable reputation and has been twice compelled to increase its capacity to meet its customers demands. Pittsburg shales, which are well known to clay goods consumers are used in the company's products. The company manufactures vitrified clay conduit, both single and multiple duct, vitrified sewer pipe, conduits, hollow building blocks, drain tile, etc. Some of the electrical corporations that use this duct are: The Metropolitan Street Railway Company, Kansas City, Mo.; Missouri & Kansas Telephone Company, Kansas City, Mo.; Home Telephone Company, Kansas City, Mo.; Stromberg-Carlson Telephone Company, Chicago, Ill.; Southwestern Telegraph & Telephone Company, Chcago, Ill. Large shipments have been made to each of these companies and any prospective customers are referred to them as to the merits of the conduit.

The American Conduit Company, of 170 Broadway, New York and Chicago and California, announces that Frank T. Craven will in the future represent it. Mr. Craven resigned a position with the C. J. Field Company to accept his present one. Bituminized fiber conduit, which the company manufactures, was first tried, experimentally, in California, six years ago as a conduit, and, having proved satisfactory in every way, it was then introduced into Chicago and the Middle States, and later—about a year ago—it was brought East. It is now in general use in California, in extensive use in the Middle States, and is making fine progress in the East. It is used by the United States Government in the navy yards on the Atlantic and Pacific, in the War Department, in the fortifications at New London, Conn., and in the Congressional Library at Washington, D. C.; by the Chicago Telephone Company; by the Atchison, Topeka and Santa Fe Railroad; by the University of Chicago; by the Western Union Telegraph Company, in many cities; by the Pennsylvania Railroad Company; by the Anaconda Copper Company, at Butte; by the Pacific States Telephone Company, in almost all the Pacific Coast cities; by the Elgin and Aurora Traction Company, at Elgin, Ill.; by the Colorado Fuel and Iron Company, at Denver, Col.; by the Edison Electric Company, in Southern California cities.

FOR SALE

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

FOR SALE OR ROYALTY—United States and Canadian patent on telephone and telegraph device. No *competition whatever.* A winner. Investigation asked. Address Box 114, The American Telephone Journal, 116 Nassau St., New York City. 114

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOU USE THEM EVERY DAY.—Toll Tickets for Independent Companies. Five thousand, 3 colors, prepaid, $2.50, cash with order. The American Telephone Journal knows we are O. K. Write for samples; also figures on large quantities. GILDART BROS., Albion, Mich. 112

POSITION wanted with reliable telephone company as manager or superintendent. Ten years' practical experience in telephone work. If your plant is not paying dividends, let me hear from you. Can furnish best of references. North or south preferred, but am willing to go to any part company desires. Address, Box 108, The American Telephone Journal, 116 Nassau St., New York City. 108.

POSITION.—A first-class construction man with thirteen (13) years' experience in telephone (both Independent and Bell) and electric light work, desires connection with a telephone company in its construction department. Address, Box 99, The American Telephone Journal, 116 Nassau St., New York City. 99.

WANTED—All or any part of $50,000.00. WRITE TO-DAY for particulars. The BIGGEST PAYING TELEPHONE PROPOSITION of the day. OPEN for a LIMITED length of TIME only. Address, Box 107, The American Telephone Journal, 116 Nassau St., New York City. 107

GENERAL MANAGER.—Gentleman of executive ability, for number of years general manager of (Bell) Telephone Co., fifty exchanges, 25,000 subscribers and several thousand miles toll lines, will be open for engagement with an enterprising Independent company in December. Familiar with all details of construction, maintenance, operating and successful dealing with the public. Best of references as to ability. Address, Box 109, The American Telephone Journal, 116 Nassau St., New York

WANTED—Young telephone men who would like to make extra money by easy, pleasant work during spare moments. Write now for full particulars. Address, Box 111, The American Telephone Journal, 116 Nassau St., New York City. 111

TO BUY for cash, telephone exchange of 250 to 500 subscribers in Middle or Western state. Address, Box 104, care of The American Telephone Journal, 116 Nassau St., New York City. 104

MANAGER—A good, live, energetic, capable man of experience wanted to manage a large Independent telephone system in the West. Must be able to invest not less than $10,000 in the company. Address Box 102, The American Telephone Journal, No. 116 Nassau street, New York City. 102

WANTED—Man and wife to take care of telephone exchange of 185 telephones. Good six room residence, with office attached. Address UNITED TELEPHONE CO., Malden, Mo. 115

The American Telephone Journal

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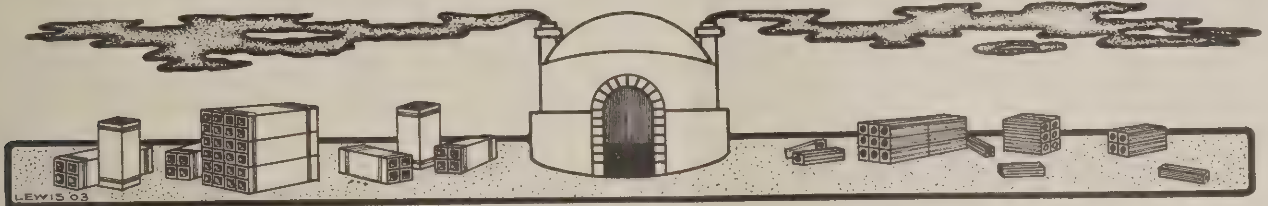

A JOINT CONDUIT SYSTEM

By W. R. Harris.

THE practicability of placing wire of different corporations in the same underground conduit system has often been questioned, and while it is not advisable to place low and high tension conductors in the same manhole, it is possible to construct and operate a joint conduit system satisfactorily. It can be so built as to have all the advantages of a separate system without the objectionable features of several systems independent of each other, which are often put down in such a manner that occasionally even one conduit and its manholes will entirely block the street intersection, thereby preventing other companies placing wires underground except at a great expense, even though there may be sufficient room in the street between the intersections for additional ducts.

This condition should not exist if other types of construction would prevent this blockade, for no one corporation should be allowed to monopolize the entire street to the exclusion of others who should have the same privileges. The first company to go underground should occupy only such space as is actually required, thereby leaving as much space as possible for future occupants, whose present needs might not require underground work, or for companies not yet organized, but which would in time be required by the needs of the community.

However, this article treats mainly of a joint system, which can only be constructed when two or more companies intend, or are compelled, to go underground at the same time or where a municipality or private corporation desires to construct a subway for general use, with the intention of charging rental for ducts occupied.

It is taken for granted that, if the gas or water mains interfere with the proper construction of such a subway, the constructing companies will be allowed to alter (at their own expense) the line or grade of such mains as are in the way. Such mains having service pipes branching off to every house should be located near the curb, so as to leave the remaining space unobstructed for underground structures.

It will be conceded that in many of our large cities conduits containing cables of various kinds cross each other and in some places are parallel to each other with a space of but a few inches between.

Such being the case, there is no reason why the same conditions should not be allowed to prevail in a joint system where the exact space between the ducts of each company can be known and determined. A point in favor of the joint system is the fact that the employees of each owner would be more apt to be careful of the other ducts, which is not the case where individual ownership prevails.

As a matter of fact a large street railway company has this year constructed a double conduit system, the manholes of which were of the type shown in Fig. 1.

High tension alternating circuits pass one side of the manhole and low tension direct circuit through the other. In this system the ducts were laid side by side for the greater distance between manholes, but about 100 feet from same the ducts for low tension conductors and the ducts for high tension conductors separate and enter

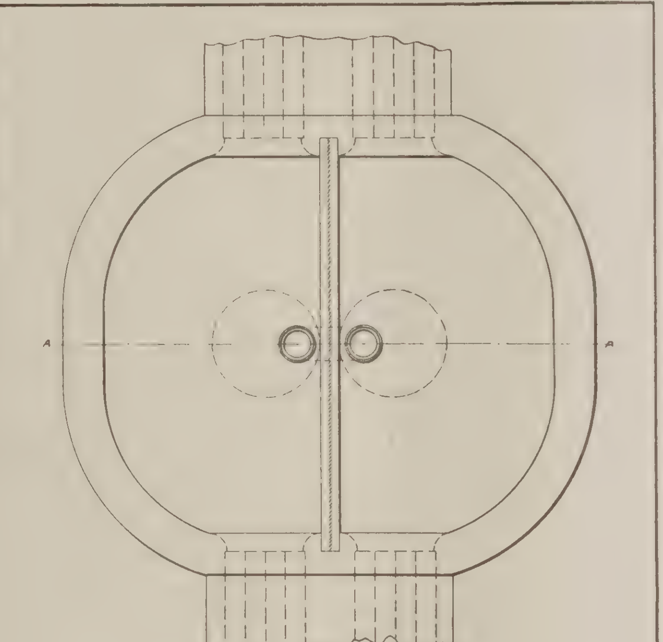

Fig. 1. Manhole for Straight Double Run.

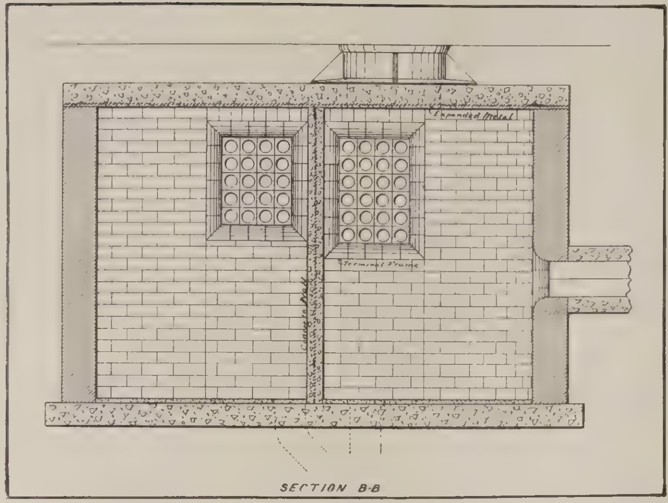

Fig. 3. Section of Line B. B. of Fig. 2.

their respective compartmentsfi as shown in the diagram Fig. 1.

The partition wall can be made of Portland cement concrete, reinforced with expanded metal, corrugated or twisted rods or other means, and can be from 4 to 6 inches in thickness. There should be a space of 4 inches or more between the partition wall and the ducts, and if a terminal frame is used, as shown in the illustrations, a very neat and finished effect is secured. The distance between the ducts at the manhole is 11 inches, and, if so desired, the ducts can be curved towards each other until a space of 4 inches is obtained between the two lines of conduit; this drawing is being done in a length of 20 feet.

According to good practice, the ducts should be laid on a foundation of concrete from 4 to 6 inches thick, and should be surrounded by the same amount of concrete, the space between the two lines of ducts should also be filled with concrete. As a separate manhole opening is provided for each compartment of the manhole, there is no excuse for the employees of one company entering the vault of the other company.

In this way the advantages of a single system are otbained with less expense than if separate systems are constructed and at the same time space is economized. Fig. 1 illustrates the type of manhole suitable for a straight double run, with no side leads, while Fig. 2 shows a manhole with branch ducts running in two directions from the main runs of each company, the branch runs being laid at a lower level than the main conduit are able to pass beneath same, as is shown in illustration, where the ducts *E* pass from vault *C* under main ducts *D*, which run from vault *B*.

The same principle of bringing ducts within four inches of each other within 20 feet of the manhole, as described above, applies to runs from all manholes.

A modification of the above described manhole will provide for any number of branch runs. The simplest form of joint conduit system has been briefly described herein and local conditions or requirements might be such that a more elaborate and larger system would have to be designed by the engineer in charge.

This two company system will occupy the greater portion of one side of the street, leaving the other side for a similar or larger system, in this way allowing four or more companies to be accommodated without unnecessary expense. The manholes shown are designed to show 9 inch thick outside walls on a concrete foundation 6 inches thick. Should the walls be made of concrete a thickness of 6 inches would be sufficient. The roof is built of reinforced concrete 6 inches thick.

The diagram Fig. 3, shows a section on the line *B B* of Fig. 2. It depicts the vertical elevation of entering ducts and the section of the lateral ones.

Experience has shown that concrete manholes are cheaper to construct and are far more serviceable in the long run than brick ones. This is owing to the fact that the concrete continues to harden indefinitely and soon becomes so tough as to resist the preditory pick of the street force much more effectually than any brick masonry. For manholes of this type a cover for each side should be provided, preferably of the round pattern, as it is lighter and cheaper.

Telephone companies about to install underground systems should investigate this joint method of conduit construction. An arrangement could no doubt be made with a telegraph company or an electric lighting or power company, by which the telephone company could combine with one of the others for the construction of a double underground conduit system, such as the one here described.

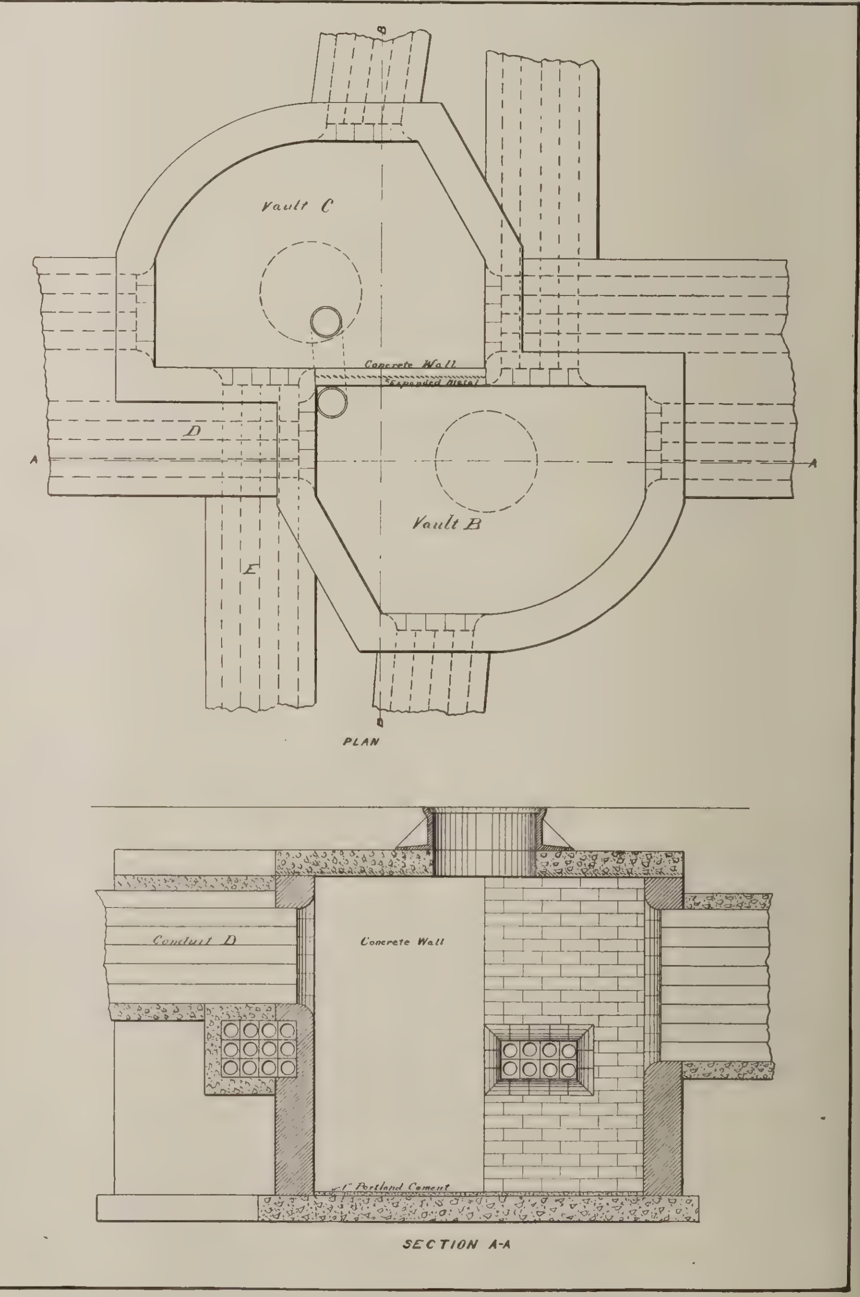

Fig. 2. Manhole with Branch Ducts.

ARE OUR TELEPHONE PERIODICALS SUFFICIENTLY CAREFUL AS TO BUSINESS RELATIONS SUSTAINED BY CONTRIBUTORS?*

By W. H. McDonough.

To make entirely clear the subject on which I have been asked to address you, I think I should first read the correspondence that passed between your secretary and myself. Under date of Louisville, October 19th, Mr. Coleman wrote me as follows: "Dear Sir—You have been selected and are requested to prepare a paper for the next convention of the Inter-State Independent Telephone Association, which will meet at the Auditorium Hotel, Chicago, December 8th, 9th and 10th, on the subject:

"'Are our telephone periodicals sufficiently careful as to business relations sustained by contributors?'

The subject as set down rather puzzled me, and I wrote to Mr. Coleman, asking that he show me just a little more clearly what it was the association wanted. In response to this the secretary wrote under date of November 16th, saying:

"I beg to state that the specific objects of the next convention will be to eliminate everything tainted with the Bell interests. In other words, the convention will endeavor to draw a line of demarcation so that there may be a distinction between the Independent companies and Bell companies, both as to manufacturing and operating interests, and so we have decided to extend it to our publications. You will remember the DeLand communications to a certain telephone periodical and have noticed others. What we want to know is when the operator reads a contribution, or an article in any electrical or telephone magazine, journal or periodical, that it is from a man and prepared by a man who is an Independent man in reality, and hence the obligations the editors of these periodicals are under."

To further make clear just what was wanted another member of the association sent me a clipping from the Mansfield, Ohio. *Shield*, of November 10, 1903, in which the following article was reproduced under sensational headlines:

"TELEPHONE FACTS

"Taken from November Issue of an Independent Telephone Paper."

(I am reading this verbatim.)

It shows the standing of various Independent telephone exchanges in Ohio for the month of August, 1903. It seems evident that no allowance whatever was made for the all-important "sinking fund" for taking care of the depreciation, emergencies, etc.

"Columbia County Telephone Co. shows a deficit of $146.15.

"Citizens' Telephone and Messenger Co., Fostoria, shows a surplus of $81.49.

"Mansfield Telephone Co. shows a surplus of $10.18.

"Massillon Telephone Co. shows a deficit of $9.49.

"Stark County Telephone Co. shows a surplus of $114.95.

"Wood County Telephone Co. shows a deficit of $126.44.

"Should any of the exchanges above mentioned suffer from a severe storm or other disturbances to which all telephone plants are susceptible, or when their telephones begin generally to pack and give out, as some makes do after being in service for two or three years, how is this question of extra expense going to be taken care of?

"Remember another thing—that a plant, during the first year or two of its operation, will not show up its weak points as rapidly as in the third and fourth year. Should you desire, however, to 'take the bull by the horns' and invest, please remember this last remark.

"A. L. Irish."

This has the mark "1 t"—showing it is a one-time paid advertisement, paid for by the local Bell Company.

As we, in our paper, have been fighting just this sort of Bell work for a long time, I naturally accepted the committee's invitation to make an address along lines that might bring a reform in the promulgation of matter that lends itself to the uses of the Bell Company. At the outset I will say very frankly that the editors of our publications are not in many cases sufficiently careful in ascertaining the business connections and other affiliations of those who offer contributions to their columns. Conditions prevail in the Independent telephone industry which prevail nowhere else. And because of these conditions the editors of the telephone papers are, or should be, required to consider questions that do not obtrude themselves in the journalism of any other trade or profession. The Bell people employ such invidious methods in their effort to stifle competition that those of us who are engaged in the industry, and depend upon its success for prosperity, can hardly do the most commonplace thing without subjecting our action to the closest scrutiny in order to ascertain whether or not we are playing into the hands of the enemy. This, in many respects, is an unfortunate condition, as it undoubtedly hampers the development of the telephonic art. But there it is, and the responsibility to meet this condition is squarely up to every man who is in any wise connected with the industry. He who fails to meet this responsibility, and through such a failure jeopardizes his interests or the interests of others in the business, is guilty of a grave fault for which he should be held to a strict accountability. It is a peculiarity of the Independent business that more than in any other industry the injury of one is the concern of all. You cannot damage the smallest operator or the smallest stockholder without doing grave damage directly or indirectly to everyone who has money invested in the Independent field. This is due not to the fact of an interwoven relationship of the eight or ten thousand concerns that are connected near or remote with the Independent business, but to the fact that the Bell Company has spies and agents everywhere whose main business it is to pick up information, in print or otherwise, that may be paraded in the newspapers of the country to the detriment of the industry in general, and for the purpose of scaring off local capital on which the Independent depends. The Bell has conducted a press campaign that for thoroughness and ingenuity and unscrupulousness has probably never been exceeded in this country. The editors of the telephone papers more than any other class of men in the business, know, or ought to know, this, and consequently they, more than any other, should be on their guard against uttering in their columns anything that may be used to hurt the cause by the Bell press bureau. The editors, more than any others, are in a position to appreciate the grave menace that lies in the use or misuse of the public press by the agents of the Bell Company. Their exchange and clipping service bears eloquent testimony to that every day. In our office we receive anywhere from a dozen to a hundred such items as that which I read before.

We admit that in our office we have on some occasions been caught napping, but I am happy to state that since the Bell press methods have been laid bare, we have had nothing that could be distorted even by the most astute Bell manipulators into material for a press campaign. About the narrowest escape we had was in the case of a man whose actions in this line have since become notorious. When the American Telephone Journal first appeared in its present form, this astute gentleman put himself into touch with us and prepared for us a series of articles bearing on the telephone situation as he professed to see it. At that time his position in the Independent field and his reputation was just being suspected. But writers on telephony were few and far between, and he made the most of this situation and secured admission to our columns. Fortunately for us, and we believe for the Independent cause, the true character of this man and his true and harmful relation to the Independent industry was made manifest shortly after the publication of his first article, and we promptly returned to him the balance of the series, five in all. Two of the five articles had already been put in type, but the proofs were returned to their author with the manuscript and the type was destroyed. We hoped that this would be the end of this person in print, so far as the Independent press was concerned.

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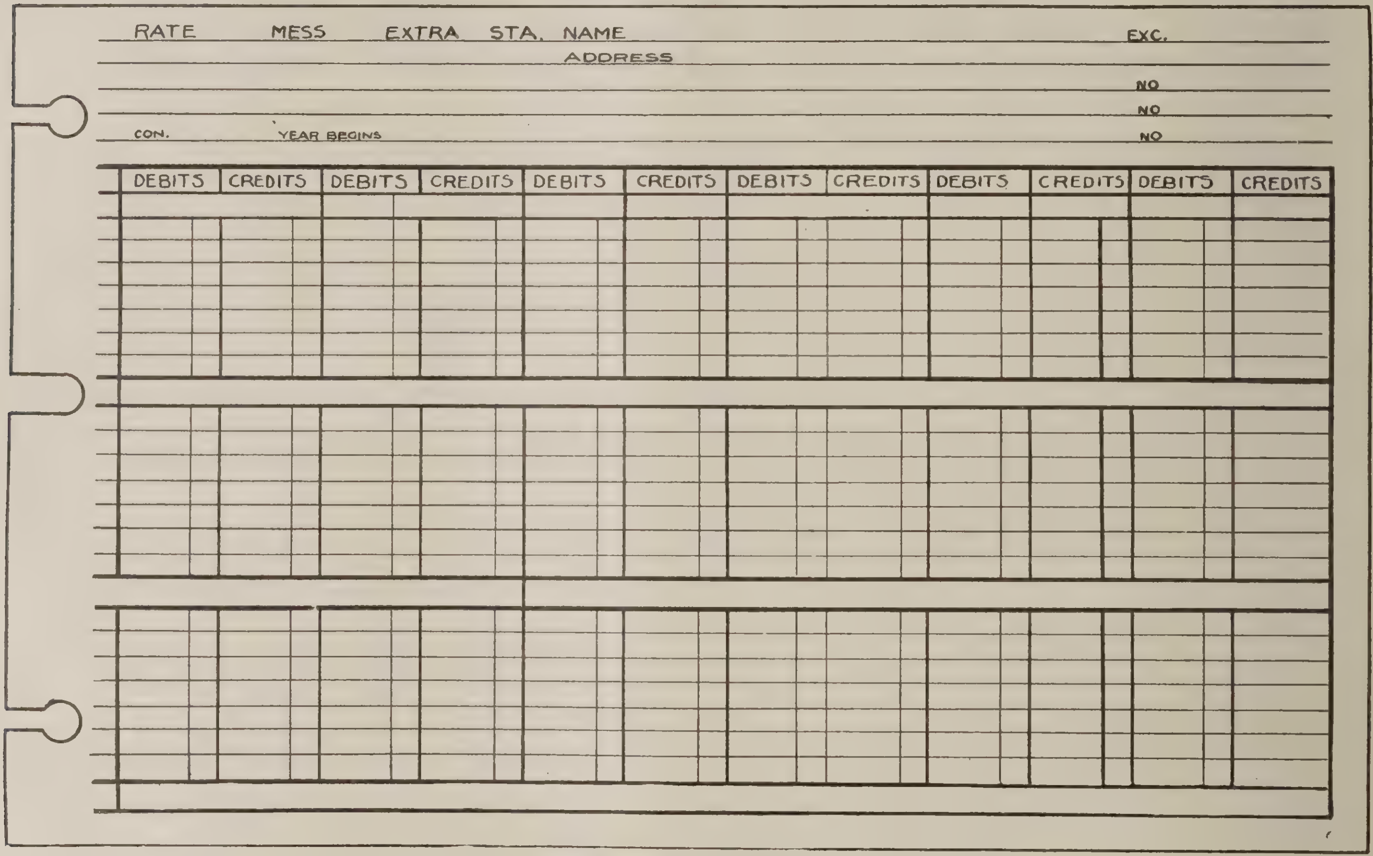
* Paper read before the Inter-State Independent Telephone Convention, December 10, 1903.

It was with serious apprehension, therefore, that I saw another series, by the same author, produced a few months afterward in one of our monthly publications.

Unfortunately, it has been impossible to prevent entirely the publication of his articles, and they have continued to appear steadily in various forms, though always anonymously.



RATE MESS EXTRA STA. NAME EXC.

ADDRESS

NO

NO

CON. YEAR BEGINS NO

DEBITS	CREDITS	DEBITS	CREDITS	DEBITS	CREDITS	DEBITS	CREDITS	DEBITS	CREDITS	DEBITS	CREDITS

Fig. 1. Rental Register Form, Loose Leaf System.

What must be the result of such a publication? Of course, every practical man in the telephone business knows that these figures, put forward in such an ingenuous and serious manner, are manipulated in the most dishonest fashion, that they are deliberately garbled to suit the purposes of the writer and that they misrepresent entirely the true condition in the telephone field. But it should be borne in mind that matter of this kind is not meant for consumption by practical telephone men. It is cooked up in an expert way in order that it may later be dished up through the lay press to frighten off prospective investors in Independent securities. It is this phase of the question raised by your committee that is really and gravely serious.

I have spoken at some length, especially of this particular series of articles, because the author through his unflagging energy has kept himself and his writings, signed and anonymous, more persistently before us than almost any other man. But of late he has met a rival, or, as some say, an associate, whose success in spreading pernicious and false doctrine promises to be even greater, thanks to editorial indulgence. I mean the writings we have all seen recently by a man whose writings and statements suggest nothing so much as the inspired utterances of that remarkable Prophet of Zion City, Elijah Dowie. Zion's prophet has held us all breathless with a promise of great spiritual force that shall translate us all bodily to the glories of Paradise, if we have but faith. This telephone prophet comes along with a dynamic force which is to translate us, if we have but faith, to a telephonic paradise where the subscriber gets his service for nothing and the capitalist gets eight per cent. on his investment. And these writings would have as much weight with the people generally as the utterances of Dowie have were it not for the fact that he is given unlimited space to vent his impossible figures and theories in a publication that will be paraded by the Bell people, and very properly, as a representative Independent journal. The Independent telephone companies of Baltimore and Des Moines are just at present engaged in an effort to secure permission of the authorities to raise their rates. Baltimore desires to install a measured service which shall result in giving it an average revenue of something like $50.00 per station. Des Moines also asks a fair increase. Both these companies, like scores of others throughout the country, like Cleveland, Pittsburgh, Toledo, etc., base their plea for higher rate on the statement that at the present rates they are unable to provide for interest, sinking fund, maintenance and operation, because the services in these cities have far outgrown anything deemed possible by the men who secured the original franchises and made rates on a low revenue basis. What will be the answer to these applications for increased rates when this telephone prophet is permitted to state in the columns of one of your telephone papers that he can give unlimited service in Baltimore, Des Moines and other cities, large or small, regardless of the number of subscribers, at $10.00 and $15.00 per year; that he can build on the *same basis,* the extreme capitalization per station being, according to his figures, $61.00, with capital assured 8 per cent. at these rates and the cities guaranteed all underground construction, not a pole to be used in the entire plant? When such matter is put out seriously as a leading article in one of your papers, I think you are entitled to ask the question propounded by your committee: "Are our telephone periodicals sufficiently careful as to business relations sustained by contributors?"

VALUE OF THE LOOSE LEAF SYSTEM TO AN OPERATING COMPANY

By Berton Elliot

THE business house equipped with the smoothest running and best regulated system is, other things being equal, sure to forge ahead of its competitors in to-day's fierce struggle for commercial supremacy. Realizing the importance of establishing in their office a system as nearly devoid of friction as possible, business men are eager to obtain facts concerning any time or labor-saving system. Every business man owes it to himself and to his business to investigate them thoroughly, but he should investigate them with the utmost thoroughness. Before adopting any new system the greatest care should be taken to ascertain that it is system and not "red tape"; that the cost of its maintenance does not exceed the amount of money it saves.

In the telephone business especially, it is necessary to systematize the office routine. Operating companies have such a mass of intricate detail to contend with that the office system must tend toward the economization of energy at every point. The fact that so many of the largest operating companies throughout the country have adopted the loose-leaf system for keeping office records should make a description of the loose-leaf system and its advantages to an operating company not only decidedly interesting, but of practical value. The specific advantages of the system as adapted to operating companies will be best understood if the general advantages peculiar to the loose-leaf idea are first given.

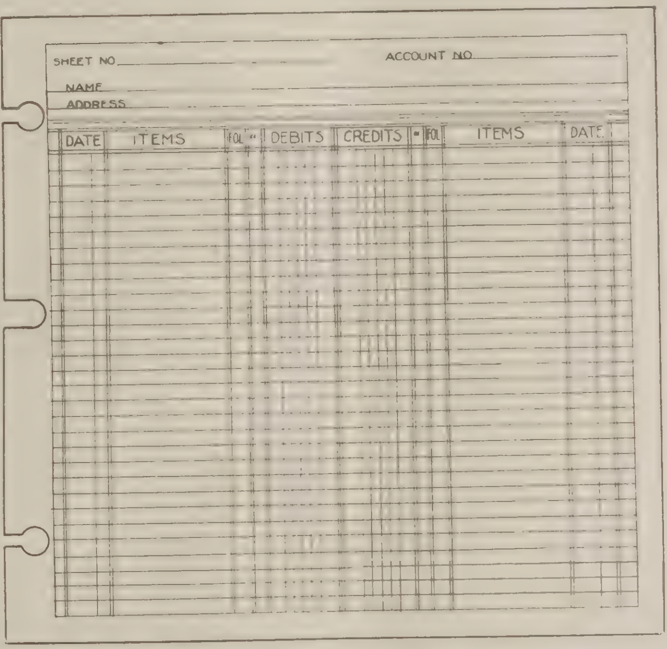


Fig. 2. General Ledger Form.

In loose-leaf books the leaves are, as the name implies, loose and interchangeable. Instead of being sewn in place, they are firmly locked between the covers. When the covers are locked the leaves are held in place so securely that it is impossible to remove one without tearing it out and thus leaving a stub. Loose-leaf books are self indexing. That is, the index is distributed between the leaves. As few or as many leaves as necessary may be placed under each division of the index. As the business grows each index division may be expanded as fast as required. When the covers are unlocked the leaves may be rearranged or classified as desired. Should a leaf be misplaced through error it is an easy matter to transfer it to the proper place. Rewriting the leaf is rendered unnecessary.

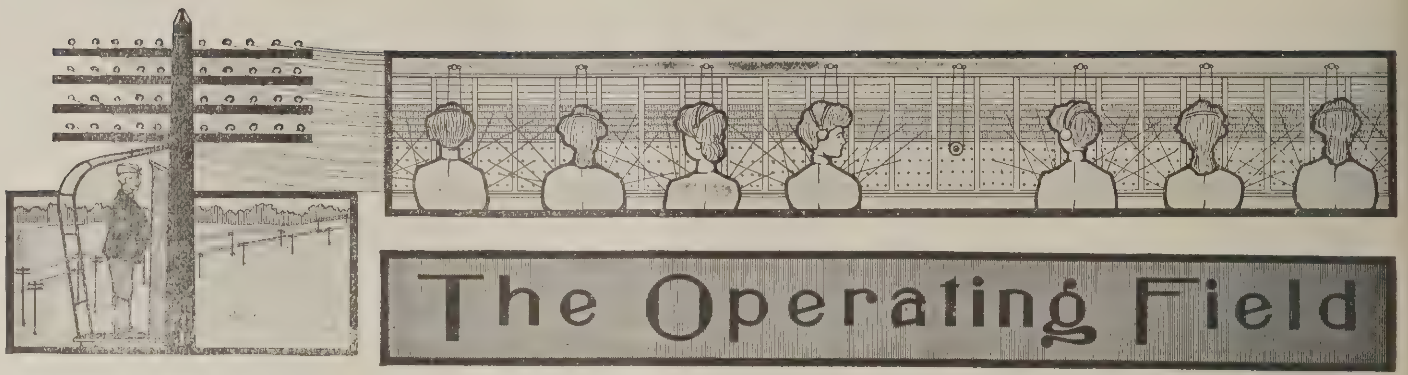
Loose-leaf books are perpetual. The arduous task of periodically opening a new set of books is done away with. There is no inaccurate guessing at the number of leaves to allow each account. Each account is given one leaf and both sides of the leaf are used. As soon as both sides are filled the leaf is removed from the current book and a fresh leaf is then inserted in the vacant place. So it will be seen that the loose-leaf ledger is perpetually a current book. Each account is kept continuously in one place. The current leaf is in one book and the remainder of the account is in exactly the same relative position in the transfer. This is of incalculable benefit in tracing any ancient transaction.

The illustration, Fig. 1, shows a rental register form well adapted to an operating company. Its value is very materially increased when used in loose-leaf form. Telephone users, with very few exceptions, subscribe for a telephone continuously, from year to year. The necessity of rewriting thousands of names each year can be done away with by arranging sheets so that they will last from three to six years for each customer, as shown in the illustration. It is not only desirable for this reason, but also from the fact that in case a telephone is discontinued by one party and transferred to another, the only necessary entry on the rental register is the entry of transfer and the changing of the loose-leaf from its location to the new one required by the new renter. The various extra tolls for suburban or long distance can be kept very readily through these same accounts, and with special toll book and long distance records form a complete chain showing the receipts from various sources.

It is necessary that an operating company keep careful watch of how the various general accounts stand at all times and to compare their present status with that of previous months. A general ledger in loose-leaf form is found to be of incalculable benefit. Each account is continuous in one place. All entries follow each other in consecutive order. It is with the minimum of inconvenience and the maximum of exactness that the officers can look through a loose-leaf general ledger and make comparisons that will determine for them what the future policy of the company is to be. The form of ledger ruling shown in Fig. 2 is excellent for a general ledger. The amount columns being in the center comparison can be made with the utmost care.

Because of the large number of employees in an operating plant it is essential that the most perfect payroll system be in operation. As it is likely to be referred to from time to time for various information, it is quite necessary that they be kept in continuous order. There is no method of doing this quite as well as the loose-leaf system for the reason that the time sheets and payroll records emanate from different departments and frequently from different plants.

Another record book which it is of special advantage to have on the loose-leaf method is the cash book. A bound cash book would last for quite a while, and during that time would necessarily be passed from bookkeeper to bookkeeper and the entire cash transactions of the house for an uninterrupted interval would be open to the inquisitive eye of any of the office force. Under the loose-leaf plan the only section of the book open to the bookkeepers is the current monthly entries of cash receipts. They are not interested in disbursements, such being handled only by the head bookkeeper or cashier and kept in a separate binder. As soon as the monthly work is completed and the balance carried forward the leaves are taken from the different binders and collected in one permanent binder. This book may be kept in a vault or private safe absolutely free from the inspection of anyone. In case of an audit or expert examination the advantage of this system can readily be seen.



The Operating Field

NEWARK, OHIO, COMPANY GROWS.

MANAGER Charles E. Hollander, of the Newark Independent Telephone company, of Newark, Ohio, is distributing copies of the company's new telephone directory. The directory has 56 pages and is nearly twice as large as any previous one. A year ago the company had about half the number of subscribers it has to-day and the list is growing. Besides giving connection with nearly 1,200 subscribers in Newark, the company has direct connection with hundreds of Licking county people in towns near Newark, and along the country roads leading into those towns. The list just out contains the names of subscribers at Granville, Johnstown, Croton, Utica, Homer, Pataskala, Hebron, Jersey, Thornville and the "Farmers' Lines," besides a list of the 32 Licking county toll stations. The company gives a 10-cent rate (for one minute) to Columbus and has connection over Ohio and in parts of adjoining states. The Independent long distance company, with which the local company is connected, is constantly extending its lines.

The Newark Telephone Company began business in 1894, and at that time built the first Independent telephone exchange in the State. This company started with about 200 subscribers and a capital stock of $20,000. The growth was gradual till a year ago, when the old system was discarded and a complete new central energy plant installed. At present the company is adding another section to its switchboard, so as to accommodate 1,500 subscribers. Additional cables have been strung to prepare for the increase in the volume of business.

UNITED STATES TELEPHONE PLANS.

THE officials of the United States Telephone Company, Cleveland, Ohio, have succeeded in securing a large loan which will make available a large sum of money for the extension of the wires of this enterprising telephone company, says *Finance.* Just what amount has been secured cannot be learned, but it is not the full amount which the company desires to expend next year, but will give the company sufficient money to make the more urgent extensions, and will result in very largely increased earnings.

President Dickson has had prepared a sheet showing the extensions necessary, and the cost of these extensions is figured at $500,000. The company now has about $2,000,000 invested in its plant, and an additional expenditure of $500,000 is required to meet the demands of the public. The company now has 18,000 wire miles, and is earning about $360,000 a year. President Dickson says that $500,000 will give the company 9,000 additional wire miles—an increase of 60 per cent. Of this operating expense 20 gross earnings 50 per cent., making the gross earnings in the neighborhood of $540,000. The company is being operated slightly in excess of 60 per cent. Of this operating expense 20 per cent. will remain stationary with increased business, while 40 per cent. will advance with increased business. Mr. Dickson, therefore, figures that with the additional revenue the operating expenses can easily be kept at 50 per cent. If this is true, and it seems probable that it is, the net earnings would be $270,000, which would take care of bonds, preferred stock, and give 5 or 6 per cent. on the common stock. Part of the additional work has already been started, including the stringing of wires between Toledo and Cleveland. It is also proposed to string additional wires between Toledo and Columbus and between Toledo and Northern Indiana. From Dayton, Ohio, to Richmond, there is a necessity for building a new pole line for the purpose of giving Cleveland connection with Southern Indiana, St. Louis and Kansas City. This pole line is forty-one miles in length. From Byesville, Ohio, to Wheeling, W. Va., it is proposed to build a fifty mile pole line, giving additional connections with West Virginia, and also better connections with Pittsburg. It is also proposed to string additional wires between Buffalo and Erie, giving better connection with New York State. Many other lines are also in contemplation, but these mentioned are the most important.

THE CENTRAL UNION OUSTED AT MUNCIE.

THE Merchants' Association, of Muncie, Ind., held a meeting on the night of December 7th, and after a spirited review of the causes that made the meeting necessary, at midnight voted unanimously against supporting two telephone systems and pledged themselves to remove the Central Union telephones from their place of business. This action was the result of a conference which a committee of the association had with the officials of the Central Union Company, who promptly refused to reduce rates to a level with those charged by the Delaware & Madison County Company. The fight has been on for some time, culminating in a refusal to longer use the instruments because of the failure to better and improve the service as promised. It is claimed that the action of the Merchants' Association is the beginning of the end of the Central Union's service in this city.

ERIE, PA., CO. INCREASES CAPITAL.

THE stockholders of the Mutual Telephone Company, of Erie, Pa., met and voted to increase the capital to $150,000. President William B. Trask made the following report: "We want to increase our capital to an authorized issue of $150,000. Our present capital is $75,000. That would be an increase of $75,000. And this is how we would apply the new capital. As you will notice there has been $31,875.48 of earnings gone into the plant. This amount belongs to the present stockholders, so we would propose to issue to present stockholders a stock dividend of 25 per cent. We would want to sell $31,250 of new stock at par. We would leave $25,000 in treasury, not to be sold except by orders of the directors for future improvements. This last issue of $25,000 will not be needed for three years, at least, so it can remain in the treasury till wanted.

Proposed issue of stock authorized........	$75,000
Stock dividend to old stockholders..........	18,750
To sell	31,250
Balance treasury stock which will not be needed for three years................	25,000

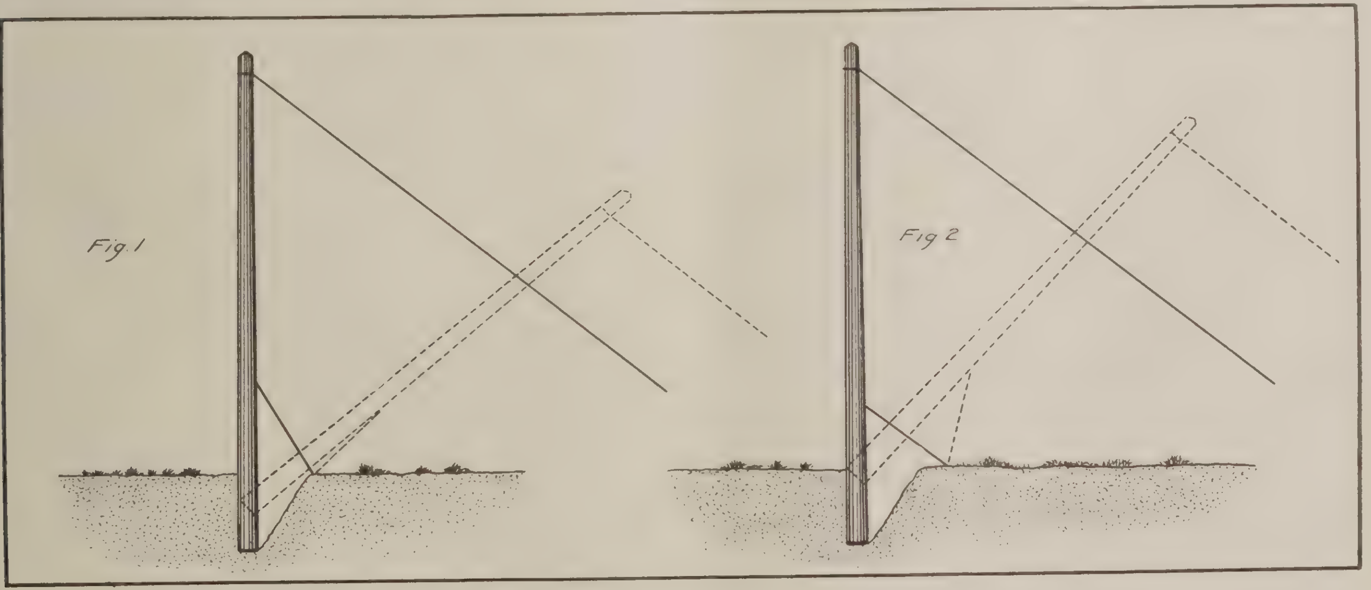
"About $9,840 will take care of our construction account for two years or so. Now we want the stockholders to authorize this new issue of stock and to subscribe to the new stock to the amount of $31,250. This amount will go into new work and give us an increased revenue. Our cable capacity is very nearly exhausted and it is absolutely necessary we have more cables out in order to provide for the new business offered us daily. You will notice the company has returned to its stockholders $22,935.75 in dividends, and has earned a surplus of $31,875.48. All of this surplus has gone into new construction. Our plant is constantly increasing and that demands all the money we have been able to accumulate to make new extensions."

MAIL DELIVERY BY TELEPHONE.

SENATOR FAIRBANKS, of Indiana, says the Post Office Department has heartily approved of the plan to employ the telephone for the delivery of mail, and that an appropriation for the experiment will undoubtedly be incorporated in the supply bill for the Post Office Department. Mr. Faibanks says he has the promise that the experiment will first be made in Indiana. However, mail delivery by telephone has already been given a practical test in Indiana. The postmaster at New Castle, Ind., found a letter in the mail addressed to Frank Pierce, Rural Route No. 2, which bore a special delivery stamp. The carrier of the route had gone and Mr. Pierce was notified by telephone that the letter had reached the office. Pierce directed the postmaster to open and read the contents to him, which was done, saving a delay of nearly twenty-four hours in delivery. J. N. Naner, postmaster at Harrodsburg, Ind., says it is a very common thing for him to read letters to the patrons of the office living in the country, and that they often ask him to answer important letters for them and send them out in the first mail. Mr. Naner thinks rural special delivery by telephone would be a great thing for the country people.

A METHOD FOR REMOVING A POLE.

THE drawing shows plainly how the method operates. The earth is taken from one side of the pole only, and a dead man is placed against the pole as shown, and then the hand line, which has been previously attached, is pulled on. This will bring the pole out of the ground. If the dead man is placed high on the pole, as shown in one of the figures, it will not fall clear down to the ground, but will be held by the side of the pole. If the dead man is placed low on the pole, as shown in the other figure, it will fall to the ground.



HOW TO SHOP TELEPHONICALLY.

THE strike of street care employees in Chicago did not affect downtown business noticeably because the telephone proved a great convenience in the emergency. Shoppers, who could not conveniently walk downtown sent in telephone orders for needed supplies, which were promptly filled. "How complete are the facilities for telephone shopping," relates the *Tribune*, "may be gathered when it is stated that each of the big stores has a telephone switchboard of its own, by calling which instant communication may be had with—in at least one case—as many as 250 departments. Most women shoppers have favorite clerks in the different departments who are more or less familiar with the customer's tastes. Any one of these clerks may be reached in a minute or two.

"In connection with the telephone switchboard each of the stores maintains a corps of expert 'shoppers.' When an order for goods is received by telephone, and no special clerk is called for, the order is given to one of these shoppers, who goes from department to department through the store, using her best judgment in making the proper purchases. It is also the duty of these shoppers to attend to the delivery of the goods purchased, and to see that the wishes of the telephone customer are complied with as nearly as possible. By the system of private exchanges and branch stations in the stores, the telephone has become a long arm, with which the stay-at-home customer can sit in her easy chair and reach down any piece of goods on any counter in ten or more block long stores, saving at the same time car fare, exertion and her own time."

SOME MORE NEWSPAPER TECHNOLOGY.

IN a burst of editorial frenzy the editor of an Illinois weekly comes forth with the following:

"It must be that the Blank County Telephone company is quietly installing a wireless telephone system; this is judged from the experience had in *The Review* office.

"That company has but one wire running into the editorial rooms, which means that we should be able to hear from but one person at a time. But when you take down the receiver in the office you imagine you hear all the people in town and that all of them have taken a turn at talking at the same moment. There is a woman who is taking a fall out of the butcher on account of the meat he sent her; another will be ordering a case of a dozen unsteamed quarts, whatever they may mean, and the brewery man replies they will be delivered; there is the milk man, also the woman who is in a hurry to get that $18.75 that she is to spend with the railroads.

"You can hear from all of them all the time, and there is only one wire with which to do it. If this is not wireless telephoning it must be a near approach. Back in the nineteenth century they talked of an improved system that was to go in; they, of course, could not imagine the twentieth century would do all of this. Yes, the improvement has got to town and it will continue to have a high time until the police can get hands on it."

The Editor's Page.

ONCE IT WAS A TOY, NOW A NECESSITY.

WHEN Elisha Gray first experimented with transmitting sound by means of electric currents, curiously enough, in common with other experimenters in the same direction, he regarded his crude telephone as a mere toy, a scientific plaything. No intimation of the epoch-making importance of this "toy" seems to have come to these pioneer explorers in the great field of telephony. Even later, when the Bell monopoly, by maintaining high rates and by absorbing the earnings of subsidiary companies, began to pile high the gold in its treasury, the full significance of the telephone was not understood. The great device was no longer regarded as a toy, but as a luxury for the well-to-do and as a convenience for the business man. That the millions who dwell in the country away from the congested districts and commercial centres, might have need of a telephone seems never to have entered the heads of the Bell people. That the telephone would become a necessity in almost every home when surrounded by reasonable and proper conditions never occurred to them, if we may judge by their actions and business methods.

As we have before pointed out, not until the elementary Bell patents began to expire some eight or ten years ago, was there given an impulse to telephony which is one of the most significant signs of the times. Note that this impulse did not come from the great corporation which had undertaken to develop this new field. It came from the consumer, the people. Long had they chafed under the tyranny of this monopoly and grown rebellious at extortion, but there was no redress. As soon as these patents began to expire competition became possible and the restiveness and dissatisfaction of the people took on the form of actual aggression. In spite of the cry that the telephone was a "natural monopoly," competing companies were organized in many localities, notably in the middle west, Ohio, Michigan, Indiana, Illinois, Wisconsin, and the people became the pioneers in this movement. The farmer demanded a telephone and got it. Rates were lowered to a reasonable basis; families with ordinary incomes found that they could afford telephones, and the telephone speedily became a necessity, not only in the commercial world, but in the social and domestic life of the people.

The experiment so courageously begun in the little village of Grand Rapids, Wisconsin, as early as 1894, well illustrates the beginnings of Independent telephony and the frantic endeavors of the Bell people to crush out opposition and maintain their monopoly. In this little town, as elsewhere, the subscribers grew restive at extortionate rates and indifferent service, and finally presented a petition asking for a reduction. Failing to secure lower rates, a co-operative telephone company was formed which flourished so greatly that the very life of the Bell exchange was threatened. Then the Bell monopoly resorted to the usual means to crush out opposition. The people of the village were offered Bell telephones rent free for a period of three yars. Only one thing could prevail against such competition. That was the local patriotism of the people and the certainty that after three such years had stifled all competition rates would go back to the old mark. Patriotism won the day and the free telephones were thrown out.

THE OPERATOR MUST GUARD HIS RIGHTS.

This is what will always happen when the greed of the Bell monopoly resorts to such methods and the people thoroughly understand the situation. To the American Bell Telephone Company all honor is due for the pioneer development of the telephone and creating a demand for its use. But to the people themselves, working through Independent companies, is due the reduction in rates and improvement in service and business methods which have resulted in such an enormous expansion of the telephone industry. The telephone is becoming almost as much of a necessity and as common in the ordinary household as the clock. Perhaps it is not altogether surprising that the Bell Company failed to rise to the full measure of its great opportunity, and, instead of using the Independent movement to its own advantage, sought to stamp it out by giving free service, by frightening capital, by costly litigation, by surreptitiously buying a great source of supply from which the Independent operators were securing their equipment—the Kellogg Switchboard and Supply Company—by seeking to control patents through underhand means and similar methods. That it did so fail we can now see as we look back over the past decade and marvel at the growth of Independent telephony.

The Independent operators and the people now understand the animus behind all these moves. They have learned the meaning of Bell monopoly. They realize that to patronize a Bell concern, like the Kellogg Company, or any other, is to put themselves in the power of the enemy. Patriotism, in a restricted sense, and self-interest alike demand that they have nothing to do with the Bell monopoly beyond aggressive and wholesome competition, even though that monopoly, as in the instance cited, wears the mask of an old-time friend. There is too much at stake at this stage of the game to permit any different course. Even now telephony is only in its infancy. The field of endeavor is ever widening. What the future has in store no man can say. But that the movement will go on and on in increasing volume and importance seems certain. That the development will be along the line of Independent and local systems seems equally certain. The Independent operator must, therefore, be jealous of his rights, conduct his business along conservative and scientific lines, dealing only with friends and manufacturers who can and will protect him in his rights.

SOME FEATURES OF INDIANA TELEPHONE LAW

Compiled by R. D. Fisher.

THE general statutory provisions that control the organization and existence of corporations in Indiana apply also to telephone companies. Included in this category are the laws governing the formation of the corporation, its articles of association, the election of directors, the adoption of by-laws, the use of a seal and so forth. Only the points of the Indiana statutes peculiar to telephone companies are hereinafter noted.

Powers.—Any telephone company organized under the act has power to lease, or connect with, or purchase, other telephone lines or exchanges. (Rev. Stat. 1901, Sec. 5524.)

Railway Company May Be Stockholder.—A railroad company may become a stockholder in any telephone company or telephone exchange company. (Rev. Stat. 1901. Sec. 5525.)

Liability.—A telephone company shall not be liable for errors in messages or communications, except when such messages or communications are transmitted under contract directly by the agents or employees of the company; nor shall it be liable for any special damage sustained by a failure of its instruments to work, beyond a rebate of the rent charged for the time such instrument failed to work. (Rev. Stat. 1901, Sec. 5526.)

Stock and Liability of Stockholders.—The board of directors shall have power to make assessments from time to time on the stock to the extent, in the aggregate of its face value, for the purpose of repairing or extending its lines, and it may also, with the consent of the majority of the stockholders, increase the capital stock for that purpose. Stockholders are liable in their individual capacity for any contract, debt or engagement of the company to an amount over and above their stock, equal to the face value of the stock. (Rev. Stat. 1901, Secs. 5527, 5528.)

Service to Be Impartial.—Every telephone company with wires wholly or partly within the state and engaged in general telephone business shall, within the local limits of such telephone company's business, supply all applicants with telephone connections and facilities without discrimination or partiality, provided such applicants comply or offer to comply with the reasonable regulations of the company; and no such company shall impose any restrictions or conditions upon any such applicant that are not imposed impartially upon all persons or companies in like situation; nor shall such companies discriminate against any individual or company engaged in any lawful business, or between individuals or companies engaged in the same business, by requiring as a condition for furnishing such facilities that they shall not be used in the business of the applicant, or otherwise for any lawful purpose. (Rev. Stat. 1901, Sec. 5529.)

Disclosing Telephone Messages.—An operator, clerk, servant, messenger, or employee of any telephone company doing business in the state who discloses the contents of any dispatch or message, or any conversation had between persons while using the line of any telephone company, except to a court of justice or to a person entitled to know the same, shall be fined not more than five hundred dollars nor less than ten dollars. (Rev. Stat. 1901, Sec. 2949.)

Miscellaneous Information.—The following rules are found in the decisions of the courts of Indiana:

(a) Private Individual May Own.—A private individual may own or operate a telephone system in the state. Magee v. Overshiner, 150 Ind. 127.

(b) Regulation of Rates.—The legislature has power to regulate the tolls or rates charged customers by telephone companies, notwithstanding the patented quality of their instruments. Hockett v. State, 105 Ind. 250; Central Co. v. Bradbury, 106 Ind. 1; Johnson v. State, 113 Ind. 143; Central Co. v. State, 118 Ind. 194.

(c) Toll Service, Messengers.—A telephone company is required under the toll service, to send a messenger for a person wanted at the telephone, if he lives a reasonable distance from the receiving station, under the Act of 1885 (p. 151), making it the duty of a telephone company, within its local limits, to supply applicants with telephone connections and facilities without discrimination, if they comply with its reasonable regulations. Central Co. v. Swoveland, 14 Ind. App. 341.

(d) Rules and Regulations—Agent—Messenger.—A regulation by a telephone company that it will not undertake to deliver messages, and that any person who assists in conversation does so as the agent of the patron and not of the company does not relieve from liability to send a messenger as its own agent to notify a person within a reasonable distance that he is wanted at the telephone. Ibid.

(e) Discrimination Between Patrons.—Refusal of a telephone company to connect the instrument of a subscriber with that of another patron renders it liable to the penalty imposed by law, requiring every telephone company to supply all applicants with telephone connections and facilities without discrimination or partiality, as the duty, under the statute, does not cease upon furnishing the instrument and connecting it with the exchange. Central Co. v. Fehring, 146 Ind. 189.

(f) Use of Streets.—Poles may be erected in the public streets for the purpose of operating a general telephone system without the consent of the adjacent property holders and without making compensation to them. Magee v. Overshiner, 150 Ind. 127.

A complaint by an abutting property owner to enjoin a telephone company from constructing a trench in the sidewalk to be used as a conduit for telephone wires, alleging that the company was unlawfully digging the trench, is not sufficient to negative municipal authority to construct the trench. Coburn v. New Telephone Co., 156 Ind. 90.

(g) Mandamus.—A telephone company may be compelled by mandamus to furnish a person discriminated against the same service that it furnishes to others, independent of any statutory provision against discrimination, even though a penalty be provided by statute against such discrimination. Telephone Co. v. State, 118 Ind. 194; 123 Ind. 113.

(h) Common Carriers.—Persons or corporations engaged in the general telephone business are common carriers of news in the same sense that telegraph companies are common carriers. Hockett v. State, 105 Ind. 250. The rule that common carriers are bound to serve the public with impartiality and diligence in the discharge of their duties applies also to telephone companies. 14 Ind. App. 341.

(i) Property Devoted to Public Use.—All instruments and appliances used by public telephone companies in the prosecution of their public business are in legal sense devoted to public use and thus become a proper subject for legislative regulation. Hockett v. State, supra.

(j) Contract Against Its Own Negligence.—The rule that a common carrier cannot relieve itself by contract from liability on account of its own negligence applies to telephone companies as well as to other common carriers. Telephone Co. v. Swoveland, supra.

CROOKSVILLE TELEPHONE COMPANY ORGANIZED.

AN organization meeting of the Crooksville, Ohio, Telephone Co. was held lately in Columbus, and the following directors were named: S. R. Sonders, J. B. Rhodes, J. L. Bennett, Wm. Harris, T. R. Wilson, H. A. Skidmore, and J. C. Moore. The board organized by electing these officers: J. B. Rhodes, president; H. A. Skidmore, vice-president; Wm. Harris, secretary; J. L. Bennett, treasurer; and J. B. Rhodes was made general manager. The company has already quite a list of subscribers, and the work of completing a substantial list is well under way. It is altogether likely that Crooksville will have an exchange within a few weeks, and will have general connection with all the towns of the valley, too.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

ROAD COMMISSIONERS MAY REGULATE.

WE have had our line of poles standing in the highway near this place for nearly six years. Now the township road commissioners have ordered us to move our poles to the other side of the roadway to accommodate an electric railway to whom they have given a franchise. When we first set up our poles we were given a permit to do so by the commissioners then in office. It will cost us several hundred dollars to make the change. Can they compel us to move the poles? C. G. H.

YOU do not mention having paid anything for the privilege of locating your poles where they now stand. Assuming that you did not, the commissioners have a right to prescribe a location for your line along the highway and to change that location when reasonably necessary. They undoubtedly can do so in the present case. See American Teleg. & Teleph. Co. v. Millcreek Twp., 46 A. 140.

UNDERGROUND CONDUIT NOT AN ADDITIONAL BURDEN.

THE following comes from New York: "Is an abutting owner entitled to damages because our telephone company lays an underground conduit in the street in front of his lot, the conduit being ordered by a city ordinance and laid in accordance with its terms? F. L. W."

IN your State the courts hold that the laying of an underground conduit in front of a lot, even though the fee of the owner extends to the middle of the street, does not entitle him to damages. The courts of New York consider that such a use of the street is in accordance with its purpose and does not interfere with its use as a thoroughfare. See Castle v. Bell Telephone Co., 63 N. Y. S. 482.

RATES STAND AS FIXED BY RECEIVER.

THOMAS N. ROGERS, of Sault Ste. Marie, Mich., filed a bill in chancery against the Union Trust Company, receiver of the Michigan Telephone Company, asking for an injunction to restrain the defendant from depriving him of his telephone. The bill alleged that complainant had leased one of defendant's telephones and had paid therefore $36 per year under protest; that by virtue of an ordinance passed by the common council of the city and of charges to others, he was entitled to service at $24 per year and had tendered that amount to the company, but that the receivers insisted upon collecting the greater sum and threatened to deprive him of service if he did not pay it. The circuit judge denied the injunction, and Rogers asked a writ of mandamus from the Supreme Court to compel the lower court to set aside its order. This the Supreme Court denied, thereby holding complainant not entitled to the relief he sought.

Section 2 of an act of Congress of March 3, 1887, approved August 13, 1888, reads as follows:

"That every receiver or manager of any property appointed by any court of the United States, may be sued in respect of any act or transaction of his in carrying on the business connected with such property, without the previous leave of the court in which such receiver or manager was appointed. But such suit shall be subject to the general equity jurisdiction of the court in which such receiver or manager was appointed, so far as the same shall be necessary to the ends of justice."

The order of the federal court appointing the receiver contained this language:

"Said receiver is hereby authorized and directed to furnish all telephones and telephone service on the terms and conditions and at the rates now charged by the defendant until the further order of the court."

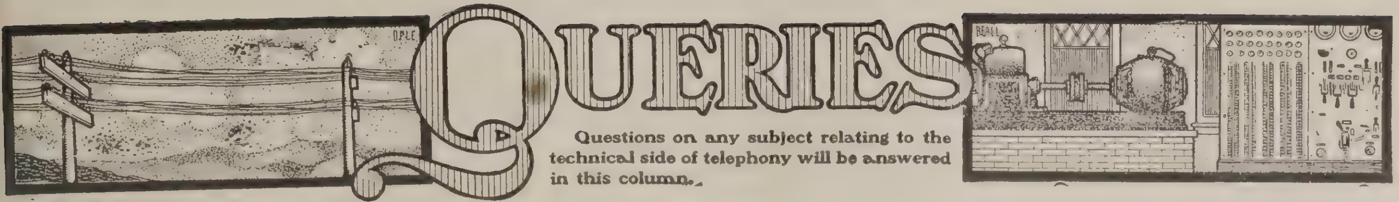
Relator contended that it was not intended by this order to direct the receiver to discriminate against any particular person and that therefore the ordinance of the council must be obeyed. The court said, however, that the order indicated that the court which appointed the receiver claimed the right to determine the rate upon which telephone service should be furnished. This right belonged to the federal court and was exclusive. The State court had no more right to determine what rent the receiver should charge one person than it had to determine what it should charge all persons. If such a determination was made, it would, under the language of the statute, be subject to the general jurisdiction of the court that appointed the receiver. Rogers vs. Chippewa Circuit Judge (Mich.), 10 Detroit Legal News 689.

COMPANY OWED DECEASED NO DUTY.

THE Court of Appeals of Kentucky has reversed a $5,000 judgment given by the Lincoln Circuit Court in the case of the Administrator of Walter Martin vs. the Cumberland Telephone and Telegraph Company. The case was an unusual one. Appellee's intestate, a young man, was killed on May 18, 1901, at Rowland, Ky., by a stroke of lightning as he was standing under a metal-roofed shed during a storm. A telephone wire of the appellant company ran over the roof of the shed within several inches of it, and the lightning struck a telephone pole about 600 yards from the shed and was conducted along the line to the shed. On this state of facts the appellee secured judgment for $5,000 for the death of Martin. The court in reversing that judgment says there was sufficient evidence of negligence in the way the wire was attached to the house to go to the jury if the defendant owed any duty to the deceased, or his death was the proximate result of its negligence, but that Martin went under the shed to get out of the rain and remained there entirely for his own convenience, and if the company had owned both the building and the wire, it would not have been under any responsibility to the deceased. Martin's Admr. v. Cumberland Teleph. & Teleg. Co., 76 S. W. 394.

USE OF STREET 21 YEARS ESTABLISHES RIGHT THEREIN.

THE city of Bradford, Pa., filed a bill in chancery to compel the New York and Pennsylvania Telephone and Telegraph Company to remove its poles and wires from the streets which it had occupied for more than twenty-one years without objection, after an expenditure of more than $100,000. Many resolutions of the city council had given permission for the erection and use of the poles and crossarms on the streets. The court held that whether the company had a franchise or not, the long acquiesence by the city in the use of the streets by the company and the city's laches in bringing suit were conclusive against the city's right to oust the company. City of Bradford vs. N. Y. & P. Teleph. & Teleg. Co., 56 A. 41.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

PLUGLESS SWITCHBOARD.—(250.)

Can you give me a circuit and an explanation of a plugless private branch exchange switchboard—the kind operated by keys? E. F. E.

The plugless type of switchboard usually consists of a cabinet or box in which are mounted a number of switching keys. The typical arrangement of the board is shown in the accompanying circuit diagram (Fig. 250), which illustrates the wiring of a six-line board arranged for three simultaneous connections. The switching keys are mounted in rows, each row having a key for each line connected to the board, the number of these rows being determined by the number of simultaneous connections, that it may be desirable to handle through the board. From an inspection of the figure it will be seen that the switching keys are of the ordinary six-contact kind and that the outer contacts of the keys, in a single row, are connected together so that if any two keys in the same row are operated at the same time the lines, connected to them, will be joined through the connecting strap of the outer contacts. This strap wiring from each row is connected through a ringing key and listening key, a separate combination of this kind being required for each row. For signalling the board from sub-stations the station is equipped with a hand generator and a high resistance drop is bridged across the line at the switchboard, this drop acting both as a line and clearing out signal. As will be seen from the diagram the incoming lines pass through each row of keys and the operation of any key serves to break connection between its line and any similar key in a lower row. The boards are usually equipped with hand generators, though it is always desirable to use power for signalling purposes when it can be obtained.

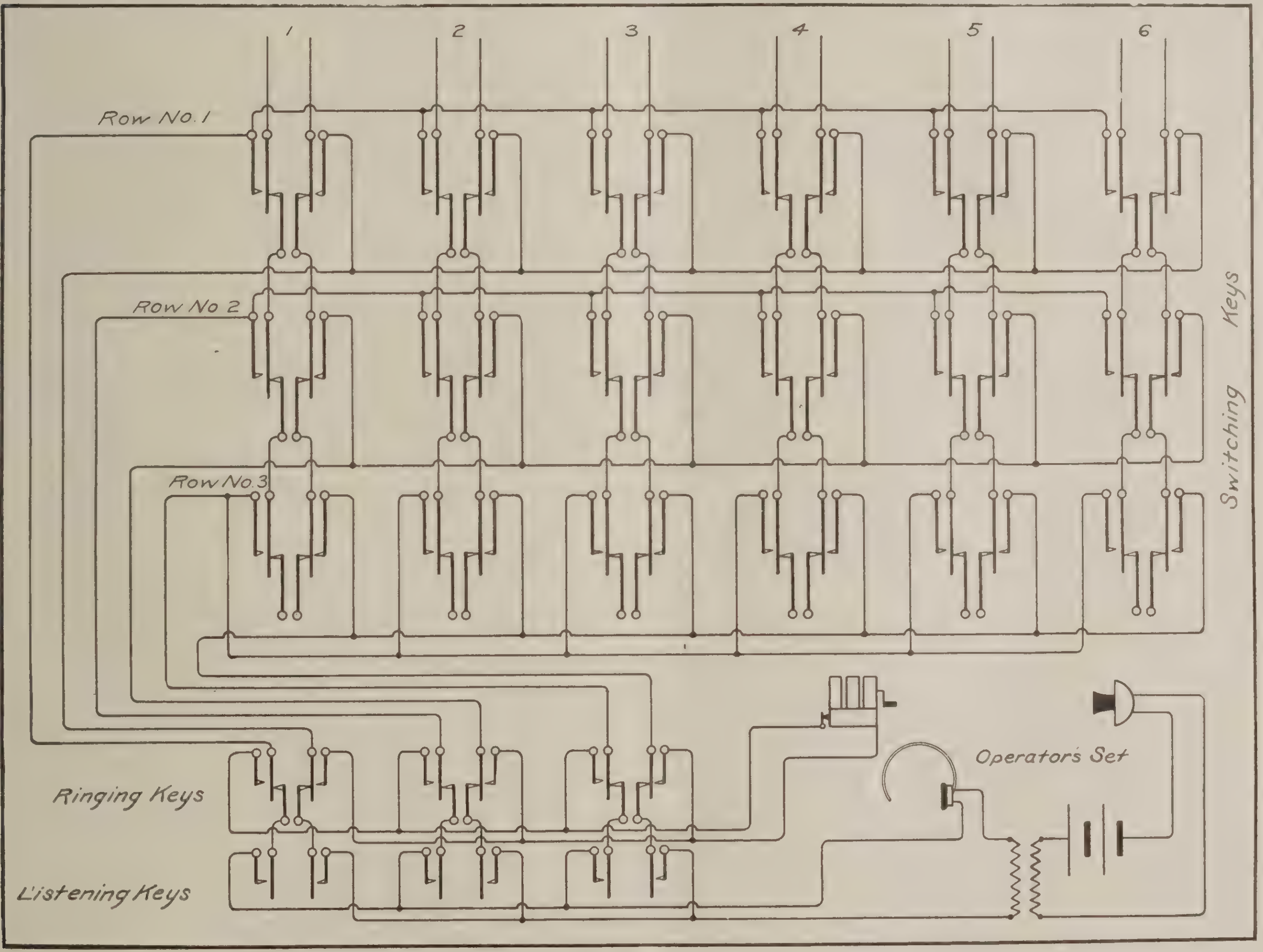


Fig. 250.

A HIGH RESISTANCE SHORT CIRCUIT.—(251.)

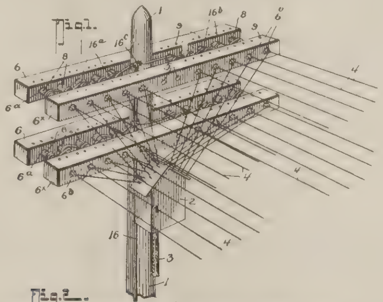
I am not a telephone man, but would like to ask you this question. The other day the green cord that connects our desk set with the bell box got wet from the steam pipe and for quite a while we could not use our telephone. The man that came to fix it said that the water caused it, but this did not seem possible to me. Was the telephone man right? We have the kind of telephones where you take the receiver off to get central. I. L. E.

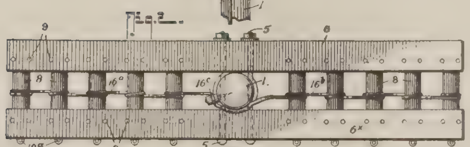
In the case which you describe the leakage from the steam pipe undoubtedly saturated the cord which connects the telephone instrument to the bell, and if sufficient water soaked into the cord it would be likely to destroy the insulation and short circuit the telephone so that it could not be used. Thoroughly drying the cord would in many cases remove the difficulty. In a case of this kind the telephone conductors might be so thoroughly short circuited that the signal at the central office would be constantly displayed and no call would be received.

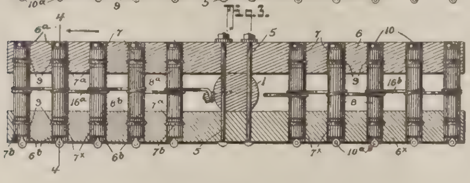
PATENTS ISSUED

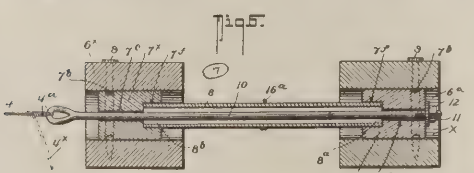
LIGHTNING ARRESTER.

Charles E. Nicholas, of Columbus, Ohio, patents (No. 745,114) an improved lightning arrester. The object of this invention is to provide a lightning arrester whereby the line to be protected will have a larger surface exposed to ground than is possible with the common forms of arresters. A perspective view of the application of this arrester to a pole line is shown in Fig. 1. Figs. 2 and 3 are respectively a plan and section of the cross arms. Fig. 6 is a section through the lightning arrester. The inventor proposes to use two cross arms on poles where lightning arresters are installed, as is shown in Figs. 1, 2 and 3. The cross arms are counter bored as is shown in Fig. 3. In the large holes a porcelain insulator is placed into which an iron tube, *8*, is inserted, which is connected to ground by means of the ground wire *16 B* and *16 A*. Through the center of the iron tube a bolt is extended, which is held in place by the holes in the porcelain insulator, and to this bolt the line wires are attached end to end. Upon the bolt a number of metal discs, *15*, are placed, which nearly, but do not quite fill the iron tube. These discs form a series of spark gaps, and a lightning discharge has in this way a number of paths to ground.



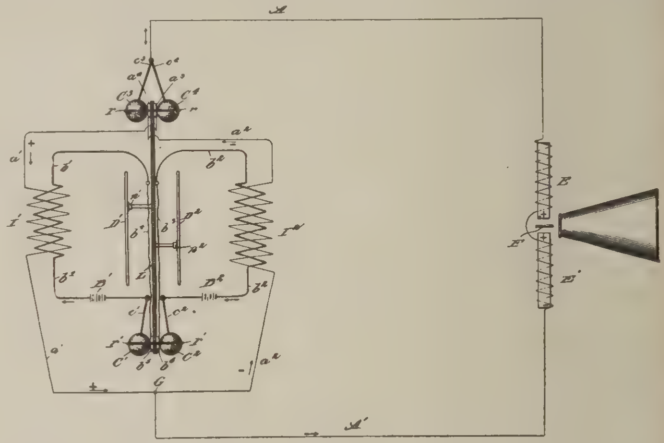






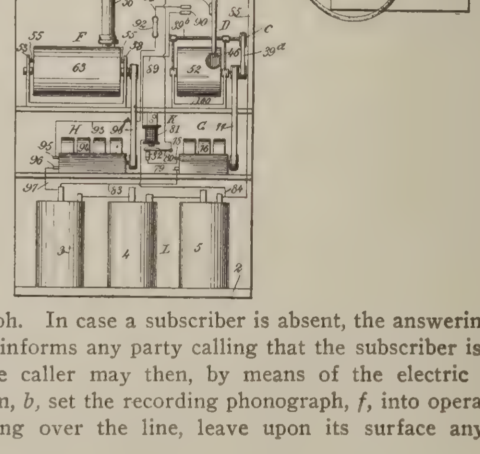
ALTERNATING CURRENT TELEPHONE.

Andrew Plecher, of Bristown, Virginia, patents (No. 745,292) an alternating current telephone apparatus. This invention is shown in the accompanying illustration, and consists of two local batteries, two induction coils, and two double microphones, operated by one or more diaphragms. The batteries are shown at *B'* and *B2* in circuit with the primary windings of the induction coils *I'* and *I2* indicated by heavy lines. It will also be seen that the batteries are in circuit with the two double microphones *C'* and *C 2*, *C 3*, and *C 4*, which are actuated by the diaphragms *D'* and *D 2*. Speaking against these diaphragms causes the resistance of the microphones to vary and consequently sets up undulatory currents in the secondary winding which are continued through the line *A A'* that ends in the receiver at *F*. This receiver consists of two magnets *E* and *E'*. Between these magnets is a vibrating diaphragm *F*. The magnets have similar poles opposite each other so that the opposite impulses of an alternating current energizes one magnet and demagnetizes the magnet of the other. This causes the flexible tongue to vibrate and reproduce the sound spoken to the transmitter.



TELEPHONE RECORDING APPARATUS.

Theo. Freese and Carl Freese, of Elyria, Ohio, patent (No. 745,342) an improved telephonic recording apparatus. This invention is shown in the figure. The inventors provide a commutator *A* which is operated by means of the electro magnet device, *b*. They provide two phonographs, *d* and *f*, or in place of phonographs, the Poulsen magnet recorder may be used. One of these, *d*, is an answering phonograph, and the other, *f*, is a recording phonograph. In case a subscriber is absent, the answering phonograph, *d*, informs any party calling that the subscriber is unavailable. The caller may then, by means of the electric magnetic mechanism, *b*, set the recording phonograph, *f*, into operation, and by speaking over the line, leave upon its surface any desired message.



TELEPHONE SWITCHBOARD.

Mr. Isidor Kitsee, of Philadelphia, Pa., patents (No. 745,019) an improved telephone switchboard. The object of this invention is to facilitate the connecting of two subscribers' lines by doing away with the cumbersome cord circuit, and therefore reducing the number of motions which an operator must make to put subscribers into talking relations with each other. This invention is shown in Figs. 1 and 6. The inventor provides what he calls a call-board and a distributing-board. Subscribers' lines terminate at both boards, and between the boards there are strips of metal which take the place of the ordinary cord in the common switchboard. Each board is equipped with sliding plugs, shown in section in Fig. 6. Each subscriber's line terminates in a metal ring, *a* (Fig. 6). This ring is split into two parts, one side of the line coming to one-half, and one side to the other. Inside of this ring is a sliding plug, *e*, which carries contacts so arranged that when the plug is depressed it passes through the plates *H* and *J* and makes connection with these plates by means of the poles *K* and *L*. When a call is received, the operator, by means of a key, *M*, depresses the sliding plug, *e*, in the call receiving board, thus connecting it with the proper strip to the distributing board. Then at the distributing board the plug corresponding to the called subscriber is depressed in a similar manner, and thus the two subscribers are placed in talking relation.

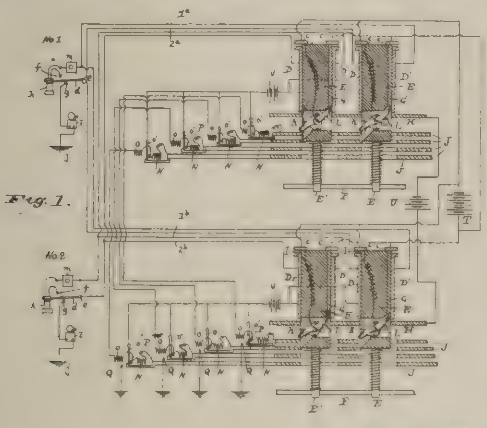


Fig. 1.

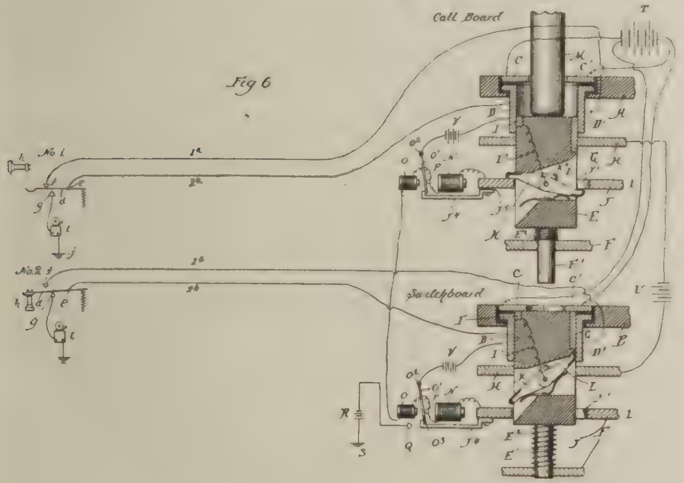
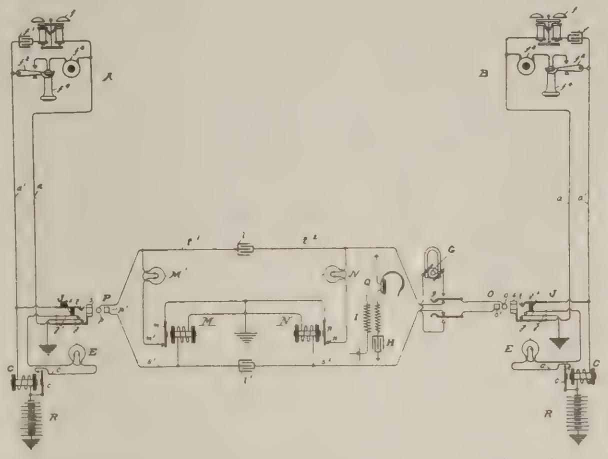


Fig 6

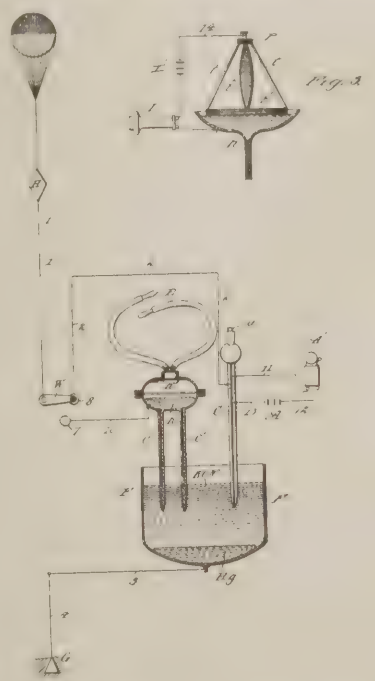
TELEPHONE EXCHANGE SYSTEM.

W. W. Dean, of Chicago, Ill., patents (No. 743,579) and assigns to the Kellogg Switchboard & Supply Co., of Chicago, an improved common battery switchboard circuit. The object of this circuit is to simplify the necessary switchboard apparatus, and to obviate the necessity of cut-off relays, and to dispense with all coils or magnets in the contact circuit. This invention is shown in the figure. *A* and *B* are two subscribers' stations of ordinary type. These extend to a jack in the central office that contains the ordinary tip contact, *t*, and a sleeve contact, *s*. In addition, there are two springs *j* and *j'*. One of these is connected to ground, and the other through the calling lamp, *E*. The line relay, *c*, is connected to one bell of the battery, *R*, the other bell goes to common battery office wire. When the subscriber removes the telephone from the hook the battery circuit is closed, relay *C* actuated, contact *c* closed, and the signal lamp is lighted. When the plug *P* is inserted the lamp circuit is opened and the lamp extinguished. The cord circuit carries two supervisory relays *M* and *N*, opened at the central office by the condensers *1* and *1'* which serve to separate the line into two halves in so far as the batteries *R* and *R'* are concerned. The relays *M* and *N* operate the supervisory signal lamps *M'* and *N'*. So long as conversation is carried on the relays *M* and *N* are excited and the lamp circuits *M'* and *N'* open. When the subscriber replaces the telephone, the relays *M* and *N* are de-energized and the lamp circuits closed and the supervisories *M* and *N* illumined.



IMPROVED RECEIVER FOR WIRELESS TELEPHONES.

Andrew Plecher, of Bristoe, Va., patents (No. 744,936) an improved receiver for wireless telephones. A general view of the apparatus is shown in Fig. 1, and an enlarged section in Fig. 3. The inventor provides a balloon to which the aerial wire is attached. At the receiving station this terminates in a capillary electrometer which is passed to the glass tube *c*, having a very small opening. In this tube there is a mercury column to which the aerial wire is connected. This mercury column also forms at the local circuit *A*, in which there is a battery and alarm bell, *A'*. When Hertzean waves encounter the aerial wire a difference of potential is created in the electrometer. The mercury column fluctuates and closes the circuit of the alarm bell. As shown in Fig. 3, a telephone receiver and a microphone floating upon the top of a liquid placed above the mercury column may be used as a receiver.



The Week's Messages.

FINANCIAL.

CHICAGO, ILL.—The Strowger Automatic Telephone Company has declared a dividend of fifty cents per share on the $5,000,000 capital stock, payable January 2d.

DUNKIRK, IND.—The Citizens Telephone Company, of Dunkirk, has filed a mortgage for $3,000, given to Newton G. Weaver.

WADENA, MINN.—A statement prepared by the Iron Range Electric Company, for the year ending November 30th, says that the gross earnings of the company were $228,793.02, on which the State will receive a tax of 3 per cent, amounting to $863.93.

AUBURN, N. Y.—The Auburn Telephone Company has increased its capital stock from $40,000 to $200,000. The company will soon erect the new building.

RIVERHEAD, L. I., N. Y.—The Bating Hollow and Roanoke Telephone Company has increased its capital stock from $5,000 to $20,000. The company will probably extend its line to Wading River and also to Flanders.

ROCHESTER, N. Y.—The directors of the Stromberg-Carlson Telephone Mfg. Company have declared the regular quarterly dividend on preferred stock and 2½ per cent. dividend on the common stock, payable January 1st.

CENTERMORELAND, PA.—A meeting of the stockholders of the Centermoreland Telephone Company has been called for January 10th at Centermoreland, to take action on a proposed increase of the capital stock of the company from $3,000 to $15,000.

OIL CITY, PA.—A meeting of the stockholders of the Petroleum Telephone company was held here recently, at which the stockholders, among other things, were requested to take action in reference to a plan for reorganizing the company and the decrease of its indebtedness, and also upon a proposition to amend the charter so as to decrease the capital stock to $225,000 and to increase the number of directors from five to seven.

YORK, PA.—The board of directors of the York Telephone Company, has declared a semi-annual dividend of 2 per cent, payable January 1st.

MORRISTOWN, TENN.—The Citizens Telephone Company, of Morristown his increased its capital stock from $7,000 to $12,000.

FRANCHISES

HAVANA, CUBA.—The Senate has passed a bill granting a concession to the Compania Nacionale, an American concern, for the installation of long distance telephones.

DECATUR, GA.—The Atlanta Telephone and Telegraph Company has petitioned the city council of Decatur for a franchise to construct a system in this town. The petition came up at a recent meeting of the council, but an application was refused because of the fact that a representative of the Atlanta Company was not on hand to answer the arguments of the Bell Company.

EVANSTON, ILL,—The Citizens Telephone and Telegraph Company which recently made application for a franchise, is said to now have the support of over 500 citizens who have promised to subscribe for telephones and stock. The incorporators are James E. Keelyn, W. S. Mason, Schuyler J. Stratton, W. J. O'Connell and James F. Connor. The company has a capital stock of $150,000, and it is planned to connect it with the Illinois Telephone and Telegraph Company of Chicago.

MEDORA, ILL.—The Medora Telephone Company has made application to the board of supervisors for a franchise to construct lines from Ruyle, Fidelity and Jersey Townships.

SALEM, ILL.—The Farmers' Telephone Company has selected Thomas H. Fulton, of Stevenson; John Hershberger, of Salem, and D. L. Cover, of Inka, as a committee to present a petition to the Salem city council asking for a local franchise.

VALLEY JUNCTION, IA.—At a special election held here recently a franchise was granted the Grimes Mutual Telephone Company. The company has headquarters at Grimes.

PARIS, ME.—The Mount Micah Telephone Company recently formed to furnish telephone service in Paris and West Buckfield, has petitioned the selectmen of Buckfield to grant it a franchise.

NEW ASHFORD, MASS.—The selectmen of New Ashford have petitioned the Williamstown Board of Selectmen to grant them a right to erect poles from the New Ashford town line to South Williamstown, in order that the two towns may be connected by telephone. The petition is signed by all the selectmen of New Ashford. The Williamstown board has referred the petition back to New Ashford, saying that inasmuch as the name of the company asking for the franchise is not given they cannot do anything with the matter until they have the company's name.

CHARLEVOIX, MICH.—The city council of Charlevoix has been petitioned by the Swaverly Telephone Company for a franchise.

YPSILANTI, MICH.—The telephone ordinance asked for by Garry W. Dinsmore, representing the Washtenaw Home Telephone Company, has been re-introduced in the city council.

FARIBAULT, MINN.—The Tri-State Telephone Company has been granted a franchise by the common council to construct its lines through the city. A local exchange will be established if sufficient patronage can be secured.

HURON, S. D.—F. C. Goecke, of Canova, and C. E. Wizard, of Howard, have applied to the city council for a telephone franchise.

COMBINATIONS.

TORONTO, CANADA.—The Stark Telephone, Light and Power System, Limited, has been organized here, with a capital stock of $1,000,000, to take over the Humber Light and Power Company, Limited, at Toronto Junction. The new company will operate the Stark patents, whereby telephone, telegraph, light and power service is furnished by one plant over the same circuit. The company will immediately commence installing a telephone service in Toronto Junction, where it has been granted a franchise.

NEWTON, ILL.—The Newton Telephone Company has been sold to Milton Matthews for $9,000.

ORD, NEB.—The Valley County Telephone Company is negotiating to purchase the Independent exchanges at Ord and North Loup, and are organizing a mutual company.

PERSONAL.

MRS. H. BROWN, chief operator for the Central Construction Company, who was stationed at Toledo, Ohio, has been transferred to Kansas City, Mo., to take charge of the opening of the exchanges there.

J. W. CLIFTON, of Fort Worth, Tex., has been appointed special agent for the Fort Worth Telephone Company in the city of Fort Worth and vicinity.

MISS ISABEL DUGGAN, of Chicago, has been appointed chief operator for the Toledo Home Telephone Company, to take the place of Mrs. H. Brown. Miss Duggan has had a number of years' experience with the Chicago Telephone Company, having been chief operator at the central exchange. She is a very capable and efficient chief operator.

W. R. EVANS, of the Marysville Telephone Company, Marysville, Kan., has just returned from a pleasure trip east as far as Ohio.

C. O. HARRIS, who was formerly superintendent and engineer for the Rochester Telephone Company, of Rochester, N. Y., has associated himself with the sales department of the Stromberg-Carlson Telephone Manufacturing Company, and is now located at Chicago.

E. HEALD, of Chatsworth, Ill., has been appointed receiver for the Peoria & Western Telephone Company.

EDWARD KLINGEL, of Edwardsville, Mo., who has recently been wire chief for the Central United Telephone Company at DeKalb, has been appointed manager of the company's office at Vandalia.

THE WEEK'S MESSAGES—Concluded.

ELECTIONS.

WAYNE, IND.—The Home Telephone Company has elected the following directors: W. L. Moellering, Charles S. Bash, L. C. Hunter, John B. Renss, G. Max Hofmann, Isidor Lehman, Max B. Fisher, P. W. Smith and W. A. Bohn. The stockholders approve of the plan to pay the outstanding bonds, $250,000, in twenty yearly installments.

WAYNE, MICH.—The People's Telephone Company, of Wayne, has elected Joseph Waltz president.

HOKAH, MINN.—The Hokah Telephone Company has elected the following officers: J. F. Klein, president; William Guenther, vice-president; W. S. Moe, secretary, and George J. Hoffman, treasurer.

SYRACUSE, N. Y.—The Columbia Long Distance Telephone Company has elected the following officers: J. J. Jermyn, president; Arthur R. Peck, vice-president; George S. Bond, secretary; R. G. Jermyn, treasurer, and F. M. Potter, Jr. manager.

WHITEHALL, N .Y.—The Co-operative Telephone Company has elected the following officers: John L. Clemons, president; James McLacklin, vice-president; Charles R. Allen, treasurer; N. E. Foote, secretary, and R. N. Clemons, general manager.

HARTFORD, S. D.—The Union Telephone Company, recently organized here, has elected the following officers: Martin McLeod, president; F. F. Vandemark, vice-president; D. W. Greatorex, secretary and superintendent, and F. W. Manson, treasurer.

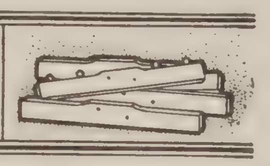
BROCK, MO.—The Farmers' Telephone Company, of Scotland County, met here recently, at which time the executive board agreed to take stock in any county telephone organization the same as the local one, to the amount of stock subscribed by the residents of that county in the Scotland County company.

UNDERGROUND.

ATLANTA, GA.—A petition has been presented to the city council by the Southern Bell Telephone Company for the right to lay underground conduits for its wires in the downtown streets.

BATH, ME.—The New England Telephone and Telegraph Company has been granted permission to lay underground conduits on certain streets.

New Construction in the Field



SAN JOSE, CAL.—The police and fire commissioners are discussing the advisability of constructing a new police telephone system for the city.

EGAN, ILL.—David Kretsinger, of this place, and others, will construct a telephone line from Egan to Leaf River.

NUNDA, ILL.—The Citizens' Telephone Company is considering the construction of an exchange in Algonquin.

SHARPSVILLE, IND.—The Sharpsville Telephone Company is negotiating for a toll line to connect with the Russiaville line. It is also arranging to build a line into Wild Cat Township.

WEST TERRE HAUTE, IND.—Erwin L. Sweet, city attorney for West Terre Haute, makes a statement that West Terre Haute will have an Independent telephone system at an early date, to be constructed by two Terre Haute men, both of whom have had a wide experience in the telephone business.

ANTHON, IA.—The Maple Valley Telephone Company contemplates extending rural lines out of Anthon and expects to expend at least $2,000.

FT. DODGE, IA.—The Fort Dodge Telephone Company will spend $8,000 in improving its system.

BELLEVILLE, KAN.—The Belleville Telephone Company has increased the capacity of its exchange by the addition of a 100 line board. They found this necessary in order to handle the many orders they have for town and rural lines.

WASECA, MINN.—The Tri-State Telephone Company is planning to construct a line from Waseca to Albert Lea.

GROVETON, N. H.—The Ammonoosuc Telephone Company will construct a telephone line between Groveton and West Milan.

TREADWELL, N. Y.—The Farmers' Telephone Company, of Treadwell, is constructing a new line to Oneonta, where it will connect with the Home Telephone Company. The new line is being built under the supervision of A. A. Chisholm and R. W. Valentine.

WOLCOTT, N. Y.—Representatives of the Wayne-Monroe Telephone Company are arranging to install an exchange here. Their line now reaches to Williamson, where they have installed an exchange and 60 telephones, and they also have an exchange at Ontario with 40 telephones. J. A. Driscol, of Rochester, N. Y., is the representative of the company here.

NORTHWOOD, N. D.—Telephone lines have recently been completed connecting New Rockford and Leeds, also Hunter and Northwood.

CLEVELAND, O.—President F. S. Dickson, of the United States Telephone Company, has completed plans for enlarging the scope of the company, whereby $500,000 will be spent during the coming year.

NEWARK, O.—The Newark Telephone Company is preparing to install an exchange at St. Louisville, Ohio. Manager Holland, of the local company, has already asked for a franchise.

STEUBENVILLE, O.—The Phoenix Telephone Company, of this city, is arranging for direct connection with the Wheeling Telephone Company.

HENNESSEY, OKLA.—A number of farmers contemplate constructing a rural telephone line to connect this place with Lacey.

CONESTOGA, PA.—The Conestoga Telephone Company held a meeting recently and arranged for the construction of a line to Birdsboro.

DOYLESTOWN, PA.—The Standard Telephone Company will extend its line from here to Landsdale, Pa.

McKEESPORT, PA.—The Pittsburgh & Allegheny Telephone Company has its new local building nearly enclosed, and will have the entire plant ready for use by February 15. The first installation of equipment will provide for 1,600 telephones, which number the company will have in McKeesport by April 1. The total capacity of the plant will be 3,600 telephones. When completed it will cost $200,000 and will be the finest Independent telephone exchange in Pennsylvania outside of Pittsburgh and Philadelphia.

PITTSBURGH, PA.—The Pittsburgh & Allegheny Telephone Company has recently installed a large exchange in the offices of the A. & S. Wilson Company, general contractors, whose wide dealings with architects, contractors and builders' supplies men made it necessary for them to have more extensive P. & A. service. Within the last six months a large proportion of the contractors in Pittsburgh have substituted the P. & A. for the Bell service, with excellent results.

PITTSBURGH, PA.—The Pittsburgh & Johnstown Telephone Company has just secured the last strip of its right of way between the two cities named, thus taking away the last Bell barrier to its early construction. The chief trouble in right of way was in Allegheny County, where emissaries of the Bell company worked tooth and nail to prevent the company, which will be a strong ally of the Pittsburgh & Allegheny Telephone Company, from getting a line to the eastern part of the State. At Greensburg, where considerable trouble was experienced in getting a franchise, the council on December 7 granted the company permission to erect its lines as desired. The work of stringing the poles will be started at once, and by February it is expected that the entire line, 97 miles long, will be ready for use. This will give the P. & A. company a metallic circuit to Philadelphia and Baltimore, enabling it to tap a large amount of business that it could not reach before.

PITTSBURG, PA.—The Pennsylvania R. R. Company will construct two trunk telephone lines between Pittsburg and Philadelphia at a cost of $75,000. These lines will be for the exclusive use of the R. R. company, and will take the place of the lines now leased by the Bell Company.

QUAKAKE, PA.—Patrick Garra, Ed. Wayne and Harry O'Neill are constructing a telephone line to connect the homes of farmers living in this section.

WILLIAMSPORT, PA.—F. L. Sheffer, of this place, local manager of the United Telephone and Telegraph Company, announces that arrangements have been completed for extending the line to Picture Rocks. Over $250,000 will be expended in Pennsylvania during the coming year for extending and improving the company's system.

CANTON, S. D.—The Co-operative Telephone Company proposes to extend its line from Canton to Fairview.

BRYAN, TEX.—The Bryan Telephone Company is preparing to construct a telephone line between Bryan and Mumford.

JANESVILLE, WIS.—The Rock County Telephone Company is constructing a new line toward Emerald Grove. Farmers residing in the Shopire district have petitioned the company to run a line to supply them with service, and it is probable that this will be done.

FREEHOLD, PA,—A meeting was held here recently to arrange for the extension of the Home Telephone Company's lines.

JOANNA, PA.—The Conestoga Valley Telephone Company intends to rebuild its line from Joanna to Morgantown.

TRADE NOTES

The Couch & Seeley Company, of Boston, Mass., has opened a New York office at 26 Courtlandt street, in the Havemeyer Building, and has appointed W. W. Bostwick, Jr., formerly with The Lambert-Schmidt Telephone Manufacturing Company, its New York manager.

The Hallett Iron Works, of 92-96 West Polk street, Chicago, Illinois, is putting on the market a line of iron goods for telephone and telegraph line construction work which are described in a little booklet that the company will send to any one interested on application. The company was one of the first concerns in the country to make a specialty of iron goods for construction work. Those that design the fittings have had long acquaintance with practical line construction which makes it possible for them to perfect each article.

The American Electric Telephone Company, of Chicago, reports that its express style switchboard still have a large sale. The following shipments of this type were made recently: Stankey, Mo., two 200 line express switchboards; Clark, S. D., one 100 line express switchboard; Gravette, Ark., one 100 line express switchboard; Rushville, Mo., one 100 line express switchboard; Rushville, Ark., one 200 line express switchboard; Nicholasville, Ky., one 300 line express switchboard; Quitman, Mo., one 100 line express switchboard; Sabetha, Kansas, one 100 line express switchboard.

The Ideal Construction Company, of Lima, Ohio, has recently secured a franchise at Hopkinsville, Ky., and is now making complete plans and specifications for the construction and installation of a telephone exchange in that city. The company is now completing a new system at St. Marys, Ohio, which is said to be a very fine one. This year the company has completed a five hundred cable capacity at Delphos, Ohio, and a seven hundred cable capacity for Lima, Ohio, in which city the contract was also secured for the installation of six hundred and fifty new telephones.

The New Haven Novelty Machine Company, of New Haven, Conn., had a very interesting exhibit at the Inter-State Convention. It met with splendid success there, and was very much gratified and surprised at the number of orders received. One especially interesting feature of this exhibit, and one that attracted a great deal of attention, was a straight sleeve and two pot-heads that were immersed in a tub of water and connected with a Wheatstone bridge and a galvanometer so as to prove that they were moisture proof. The test was entirely satisfactory, and resulted in many orders. The entire line manufactured by this firm has proved very satisfactory to the trade, and for that reason its many specialties have become very popular.

The Columbus Storage Battery Company, of 97 North Third street, Columbus, Ohio, has sent us a copy of its booklet, "The Use and Care of Storage Batteries." Besides listing the various types of cells that the company manufactures, it contains a short practical treatise covering points that its name would indicate. There is a whole lot of good, useful information in the little book, and for the practical man who wishes to learn something about secondary batteries it is exactly suited. The theory and testing of cells is treated. Among other sections are those on efficiency, charging from a lamp circuit, private lighting plants, charging dynamo and details of construction. The company will be pleased to send a copy on request to anyone interested.

The John A. Roebling's Sons Co. has just completed a new building which will enable it to largely increase its product of insulated wires and cables of all kinds, and will provide for the manufacture of submarine cables. It has made submarine cables for many years, but this part of its business seems to demand greater facilities, and to provide for this, one of the largest and most complete plants in this country will be installed. Both rubber and gutta percha core is used, and the company's present large rubber plant will take care of those orders calling for rubber insulated cables. Formerly it has imported gutta percha core, but it is the company's intention in the new plant to provide a complete factory for manufacturing this core. It is the intention to so equip the new factory that submarine cables of any kind, with any description of armor, may not only be made, but also the necessary apparatus and equipment to lay any of the cables they manufacture will be provided. The Roebling Company will be in a unique position among American manufacturers, not only in the variety of insulations it can furnish, but also from the fact that it will be prepared to take contracts to turn over to the purchaser the submarine cable laid and ready for use. They will also have the advantage of manufacturing all the constituent parts of a cable, viz., copper wire, insulated core and armor wire. This should not only reduce the cost, but it should insure to the purchaser the very best materials, all manufactured under one supervision and for which one company will be responsible.

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VOLUME VIII SATURDAY, DECEMBER 26, 1903 NUMBER 26

CHINAMAN MAKES A SWITCHBOARD

By Albert Snead, *San Francisco, Cal.*

話筒電报

THERE has just been unearthed in San Francisco's Chinatown a Chinese mechanic who has made, with the crudest of tools, a perfect telephone switchboard. Jay Hoy is the name of this wizard, and "unearthed" is used advisedly, for he works, eats, sleeps and has his recreation in a little room, eight feet by ten, which is practically underneath the ground in the very heart of Chinatown. The photographs illustrating this article give a very good idea of how this switchboard looks and the story of how it was built, which is also practically the story of the Chinese inventor's life, is an interesting one.

Jay Hoy has always had a bent for mechanics, which has been handed down to him from generations of his ancestors. They were all, according to an old Chinese tradition, goldsmiths, and Jay Hoy early learned to beat the precious metal into all sorts of curious shapes. He came to this country after he had grown to manhood and was amazed at all the wonderful machines he saw here. It became the passion of his life to understand them and the fact that he has produced a working telephone exchange speaks volumes for the success of his ambition.

Perhaps not the least wonderful part of it all is the fact that he never learned to speak English and understands only a very little. All he has learned of our inventions has been through the sense of seeing alone. His first position, when he came to this country, was as a laborer in a saw-mill, and one of the first examples of his handiwork was a perfect working model of this saw-mill.

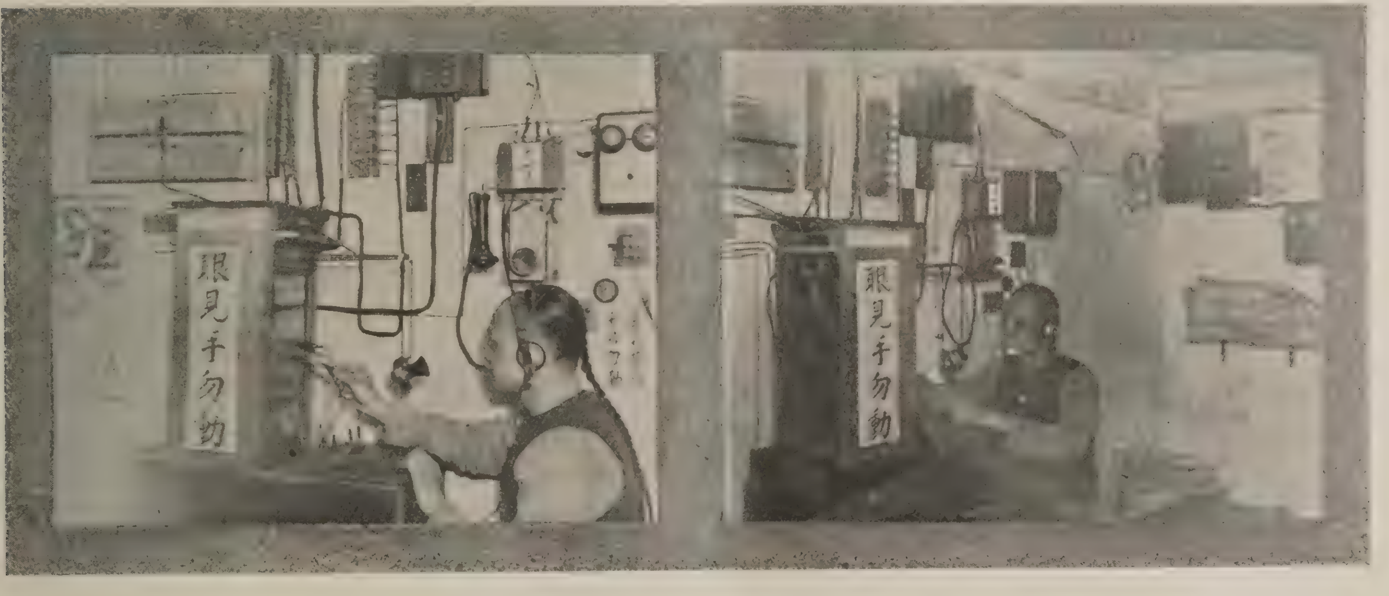
He then turned his attention to the trolley cars, which were a source of never-ending wonder to him, and to the amazement of every one who hears the story, he constructed a perfect working model of a trolley car which he runs by means of a storage battery.

After making successful models of a great many of our machines, he one day saw the Chinese telephone exchange in San Francisco's Chinatown and, on the spot, determined that he would make a telephone exchange of his own. This he has done and also the telephones which he operates through the board. A description of his switchboard will show that he has caught the idea and has carried it out with remarkable fidelity. It is a single position board, built of California redwood and equipped with twelve subscribers' jacks and line signals, giving service to several connected telephones in the building.

The system employed is the express, it being modeled after the exchanges used in the small towns throughout the Pacific Coast. The subscribers' jacks are mounted four in a row on a hard maple strip, and are numbered in Chinese. The springs are of German silver; the sleeve annunciator is grounded while the tip annunciator goes to indicator battery through the low wound subscriber signals.

Fourteen dry batteries are used in the operation of the exchange. The jacks are mounted in the lower portion of the panel, while the signals occupy the upper portion. The key-board is equipped with four pairs of cords, with associated ringing and listening keys. The tip of the cord has a condenser cut in between the answering and calling plugs, with clearing indicators on either side. The sleeve is grounded through a retardation coil, thus giving the operator supervision of either end of the switch. The cords ring metallic, either front or back, the power being furnished by a small hand generator mounted under the key-board. The diagram on the next page shows the circuit.

The ringing keys are well made, springs being made of German silver, and are mounted on fiber strips; these are screwed on a piece of wood and the plungers are fitted in this. All the subscribers' signals, clearing signals, retardation coils, ringing and listening keys and cams, condensers, plugs, etc., as well as the


眼見手勿動
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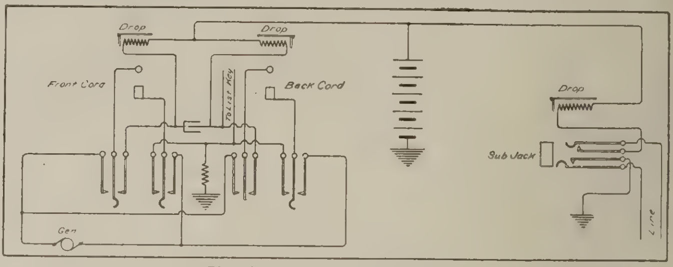
Two Photographs of Jay Hoy Operating His Switchboard.

frame of the board, in fact, everything except the head receiver and transmitter were made by the hand of the enterprising Celestial without the assistance of anyone.

The tools with which he has accomplished this are limited and crude and only increase the wonder. The work was all done with a file, a hack-saw, and a few small drills. Although the board is not the equal of some of the modern boards turned out in our big telephone factories, yet the accompanying illustrations clearly show that Jay Hoy does not need to apologize for his work. His telephones are also hand-made, and visitors desiring to test the system may do so through three or four telephones in his shop that are connected with the switchboard.

The Chinese characters on the side of the switchboard read, "Hands off—Don't touch," which shows how jealous Jay Hoy is of his handiwork. When any of the readers of THE AMERICAN TELEPHONE JOURNAL visit San Francisco they will find Jay Hoy at No. 736 Jackson street, in San Francisco's Chinatown. He will take great delight in showing this wonderful little exchange and many other electrical appliances which he has fashioned.



Circuit of Jay Hoy's Board.

RINGING APPARATUS FOR SMALL EXCHANGE

By A. Dallam O'Brien.

As the number of lines which must be handled by a single switchboard operator increases, the time consumed, where the operator uses a hand generator for signalling, becomes a large percentage of the total time required to handle connections, and the necessity for relieving the operator of this labor becomes more and more apparent. Even in 50-line exchanges, the labor involved in manual ringing is considerable, and the substitution of a power generator will produce gratifying results. There are a number of methods in use for furnishing ringing power where the capacity ranges from 50 to 500 lines.

First. The ordinary hand generator is constructed with unusually powerful magnets and in place of a crank, is provided with a pulley and is driven by means of a belt connection from a small electric motor, or, in some instances, from a water motor, which can be connected directly to the town mains.

Second. A ringing machine is located at some distance from the exchange, where a source of driving power is available and the ringing current conveyed to the central office over conductors from the generator.

Third. Where power is available at the exchange, a motor-generator which consists of a dynamo having two separate windings on the same armature, one of which is connected to a commutator and acts as a motor winding to turn the armature, the other winding being connected to collector rings and acting as an alternating current generator and furnishing the necessary power for signalling.

Fourth. With common battery exchanges either a motor-generator, as described above, may be used, or else a motor and dynamo direct connected, may be employed; in either case the motor side of the combination being run from the storage batteries and the generator side furnishing alternating ringing current.

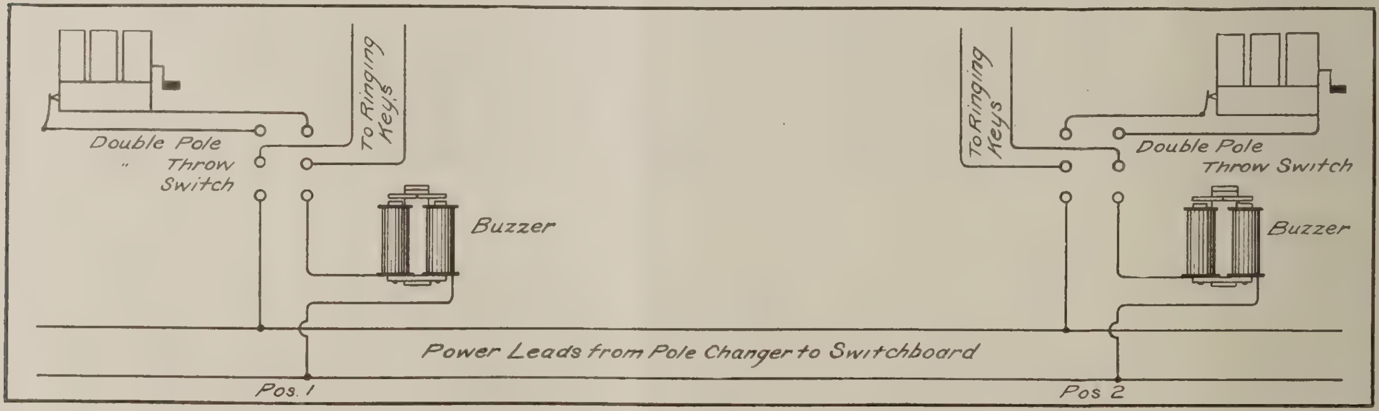


Fig. 2. Power Leads from Pole Changer to Switchboard.

Fifth. Last but by no means least, comes the pole changer, which seems particularly adapted for this field; and is being used to a very great extent. The principle upon which all pole changers operate, does not differ with the different makes, but depends upon the interruption of the current flow in a local circuit, this circuit controlling the movement of a vibrating armature, which in turn, by means of contacts which it carries, serves to interrupt and reverse the direction of the current in an external circuit.

The method of operation of one type of changer is clearly shown in the diagram in Fig 1. The closed circuit battery consists of one cell of any first-class battery of this type and is connected in circuit with the vibrator through its armature and the contacts of a double pole switch. The ringing current is furnished by a number of cells of any good battery, these cells being connected in series so that the voltage should be from 75 to 80 volts, thus requiring the use of from 50 to 60 cells, where primary batteries are used, and about 35 cells where storage batteries are employed.

One side of the ringing battery is connected through the double pole switch to the insulated contact points *1-1*, on the armature of the vibrator, the other terminal of the battery being connected through the relay to the armature contacts *2-2*. When the pole changer is in operation, the vibrator is kept continuously in motion and the double pole switch is closed.

The closing of this switch allows current to flow from the single cell of battery, through the switch and the winding of the vibrator magnet to the armature and thence by means of the contact point, back to the battery. The vibrator being energized, attracts its armature, which when pulled toward the magnet, opens the energizing circuit at the contact point, thus destroying the attractive power of the magnet and the armature under the influence of a small spring is brought back into contact with the point and the circuit again completed, through the vibrator magnet, which again attracts the armature.

This process is repeated indefinitely as long as the switch remains closed, the action of the vibrating armature being strictly analogous to that of the clapper of the ordinary vibrating electric bell. It will be seen from the diagram, that when the armature is attracted toward the magnet the contacts *1-2*, on the right, are closed, and a wave of current from the ringing battery, is sent over the ringing leads to the switchboard, when the armature is drawn back, the contacts *1-2*, on the left side are completed, and a wave of current again sent over the ringing leads, this time the + terminal of the battery is connected to the lead to which the — terminal was connected when the armature was in its right hand position, and thus the continuous vibration of the armature serves to reverse the direction of the current and thus supplies an alternating current to the circuit.

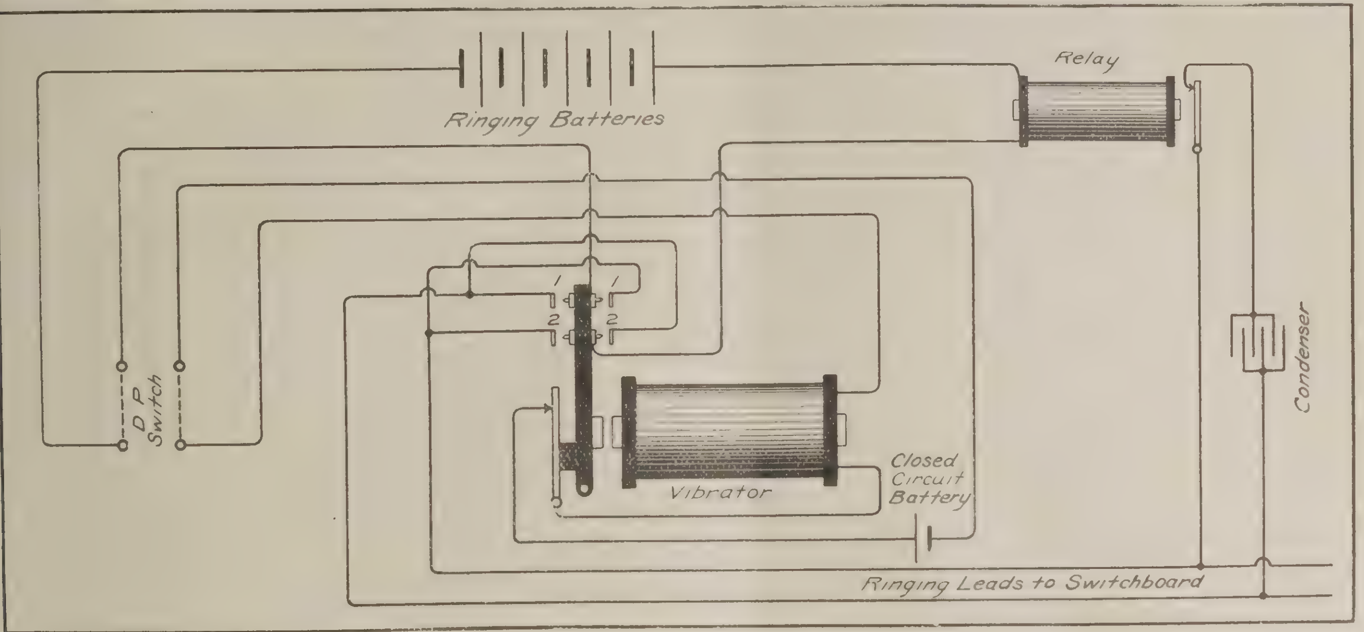


Fig. 1. Operation of One Type of Changer.

In one side of the circuit from the ringing battery, there is a relay. Whenever there is a flow of current from the battery to the ringing leads, this relay is energized and attracting its armature, closes a circuit which connects the condenser across the leads to the switchboard. The object of this condenser is to obviate the sparks that would occur at the contact points *1-1* and *2-2*, and which would gradually wear away the contacts. In addition, the condenser serves to prevent induction on lines adjacent to those which are being signalled.

The feature, that will commend the pole charger to the telephone manager, is the fact that only during such time as a ringing key is depressed is current being drawn from the ringing batteries. With almost any other method, some power is being continually expended to run the generator; for this reason the pole changer will often prove to be the most economical method.

Fig. 2 shows the manner in which the power leads from the pole changer are brought to the switchboard and connected to the ringing keys. Each position is equipped with a double pole, double throw switch, to the center contacts of which are connected the leads going to the ringing keys, the pole changer leads and an auxiliary hand generator being connected as shown, so that by the movement of the switch the ringing keys may be connected to the pole changer or to the hand generator, as desired. It is customary to include in one side of the power circuit a buzzer, as shown in Fig. 2, so that when a ringing key is depressed, and current sent out over subscribers' lines, the buzzer will operate and thus inform the operator that the pole changer is furnishing current as it should and the absence of a buzzer signal will indicate either trouble on the line or else trouble with the pole changer, where the number of party lines connected to an office makes it desirable that some system of selective ringing should be used, the pole changer can, by the addition of extra contacts on its vibrating armature, be made to furnish both alternating and pulsating current and is thus readily converted into a selective machine. The closed circuit battery which is used to operate the vibrator is usually of the Edison-Lalande type, and will operate continuously for from six to eight months without attention. The life of the batteries which furnish the ringing current, will depend entirely upon their use, actual tests having demonstrated the life of a set of batteries in a 100-line exchange to be about 18 months; for 200-line 12 months; 300 lines, 9 months, and for 500 lines, 6 months.

The voltage furnished by the machine must be high enough so that no difficulty will be experienced in ringing the longest lines and in consequence, there may be some short lines through which an excessive current will be sent, and in such cases it may be necessary to increase the resistance of the line by the insertion of a non-inductive resistance. With ordinary care the pole changer will prove to be a cheap and reliable source of ringing power for small exchanges at least, and its usefulness in large central offices will no doubt in time become appreciated.

INDEPENDENT DOINGS IN CALIFORNIA.

"LOS ANGELES is one of the best telephone towns in the country," said Frank F. Graves, of Toledo. "The Empire Construction Company turned the plant over to the Los Angeles Home Telephone Company the 1st of October, and by November 1st the company had 9,211 subscribers and a waiting list of about 500. Business houses and private residences are not particular about the number of instruments they maintain. Many private residences have two and three telephones, and I know of one grocer who has fifteen trunk lines to his place of business. His idea is that it is not a good thing to keep his customers waiting until somebody gets through with the line. The Empire Construction Company is now engaged in building telephone systems at Santa Barbara, San Buena Ventura, Santa Ana, San Bernardino, Pasadena and Hollywood. The company is also connecting all these systems with 557 miles of toll line. In each town a fine structure for offices and the telephone exchange is built. Business on the coast is good and we are not looking for hard times." Mr. Graves, who was formerly traveling freight agent for the Clover Leaf Railroad with headquarters in Toledo, is general manager of the Empire Construction Company. George Metzger, of Toledo, is the president, and A. K. Detwiler is financially interested. All three are also financially interested in the Los Angeles Home Telephone Company. Messrs. Graves and Detwiler being members of the directorate.

THE ROCHESTER COMPANY'S MASCOT

THE accompanying photograph shows in a faithful manner the cable gang of the Rochester, N. Y., Telephone Company pausing for a moment to face the photographer. It is supposed to be engaged in the arduous duty of pulling out underground cable, which has been replaced by cable of a larger number of pairs. The gang sonsists of cable foreman and assistant, six men at the capstan, one splicer and helper, the superintendent (C. O. Harris), general foreman (J. P. Haley), and a few of the rank and file are noticed posing unconsciously on the left and right flank. But perched above them all as the very pinnacle of the group is "Joe," the three-year-old mascot of the Rochester Telephone Co. It was necessary to tie him to the capstan as he could not stand still, but did so unawares just as the photographer snapped the camera. "Joe" resides in the second house on the left side of the alley shown and is three years old. Ever since he was old enough to walk he has spent his hours associating with the men and is always on hand mornings, noons and nights to see that everything moves off as it should. Possessing the usual characteristics of his race for original wit, he has endeared himself to all the men by his actions more than his words (he is not a success as a talker as yet). Many a shining penny finds its way into "Joe's" little black hand, and later the grocery man's cash drawer, which may in some measure explain "Joe's" devotion to the cause and stimulates him to arise at unearthly hours in order to be on hand when the men go to work at 7 o'clock. It has not been decided as yet as to just what "Joe's" future will be, but if he lives, and the Electrical Workers' Union will allow it, it is intended to make a cable splicer out of him. When any cable work is in progress in the vicinity of the exchange "Joe" can always be found there sitting alongside of the manhole and watching the splicer as he deftly does his work. "Joe" has not aspired as yet to riding on the construction wagons, as he has not the strength or agility to climb up to the drivers seat.

"Joe," the Mascot of the Cable Gang.

AN INTERESTING DUPLEX APPLICATION

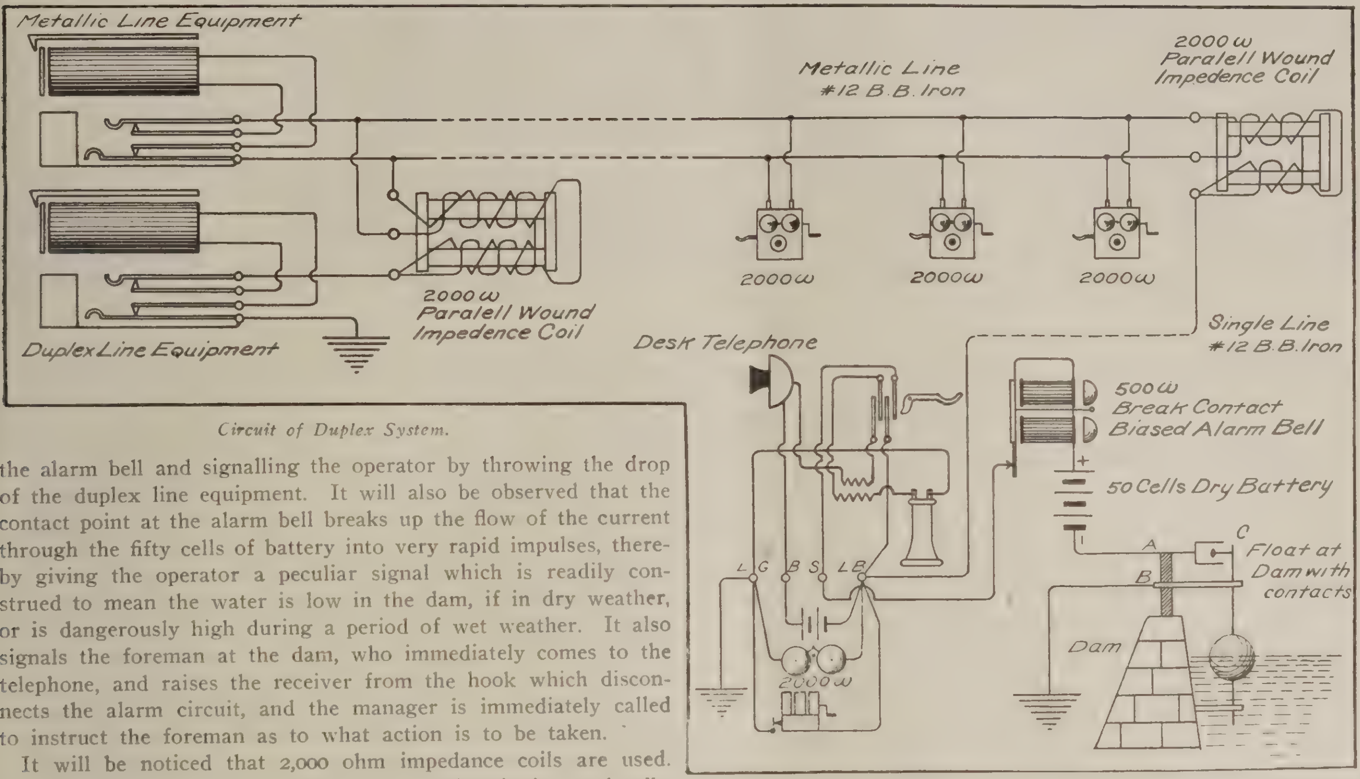
By Garrison Babcock.

INDEPENDENT telephone companies have in the past given very little thought to the adaptabilities of duplex circuits, in connection with their lines to increase revenues or convenience, but at the present time a great many of the progressive ones are giving this subject a careful study. In some instances composite sets are arranged on metallic lines for the use of telegraph apparatus to be operated by brokerage firms, commission houses or other private service, independent of the telephone system. A very interesting use of the duplex circuit is illustrated in the figure and described in the following report from the Buckeye Canal and Land Company, of Buckeye, Arizona:

We have a metallic circuit extending eighteen miles from our main office at Buckeye, up the Gila River, in the direction of our diverting dam site. It is very important that an irrigating system be controlled by the manager, who must be at all times in touch with the water supply situation; therefore, we at first contemplated building a separate circuit from our main office to the dam site, but after a careful consideration in the way of the possibiliities of a duplex arrangement, we decided to utilize the telephone circuit already constructed and used by the ranches along the Gila River. This only required stringing a single No. 12 B. B. Iron line from the extreme end of the ranch line to the dam site, a distance of three miles. The accompanying circuit of the system is almost self-explanatory, therefore we will not go into a description of the apparatus farther than explaining its operation.

At the central office a 2,000 ohm parallel wound impedance coil, with the center terminals brought out, is bridged across the metallic line and a connection from the center of this coil is wired to the tip side of the line jack connected with the line equipment, used with the duplex circuit. The sleeve side of the line jack is connected with the ground. At the extreme end of the metallic line a like parallel wound impedance coil is bridged across the line and the center of the coil is connected with the single wire, extending to the dam site. At this point the line is connected to terminal *L, B,* of desk set, while terminal *L, G,* of the desk set is connected with the ground. The other local connections, such as battery, extension bell and hand generator are connected in the usual manner. A special 500 ohm contact biased alarm bell is connected with desk set terminal *S,* at one side, and the other side is connected to the positive terminal of 50 cells dry battery. The negative side of this battery is connected to contact *A* of the float, while contact *B* of the float is connected to the ground.

It will be readily seen that telephonic communication is complete between the switchboard and the station at the dam, in the ordinary manner, but should the contact at the float be made, connecting *A,* with *B,* the fifty cells of dry battery send current through the alarm bell. This circuit may be followed out through the desk set to terminal *L, B,* to the line wire through the duplexing coil to both legs of the metallic circuit to the duplexing coil at the central office, through this to tip contact of line jack to the drop coil, through the drop coil to the sleeve contact to earth. Through the earth to *B*, and back to battery; thereby ringing the alarm bell and signalling the operator by throwing the drop of the duplex line equipment. It will also be observed that the contact point at the alarm bell breaks up the flow of the current through the fifty cells of battery into very rapid impulses, thereby giving the operator a peculiar signal which is readily construed to mean the water is low in the dam, if in dry weather, or is dangerously high during a period of wet weather. It also signals the foreman at the dam, who immediately comes to the telephone, and raises the receiver from the hook which disconnects the alarm circuit, and the manager is immediately called to instruct the foreman as to what action is to be taken.


Metallic Line Equipment
Metallic Line #12 B.B. Iron
2000 ω Paralell Wound Impedence Coil
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2000 ω Paralell Wound Impedence Coil
Duplex Line Equipment
Desk Telephone
Single Line #12 B.B. Iron
500 ω Break Contact Biased Alarm Bell
50 Cells Dry Battery
A
B
C
Float at Dam with contacts
Dam
L G B S L B
2000 ω

Circuit of Duplex System.

It will be noticed that 2,000 ohm impedance coils are used. This high resistance is necessary so that the ringing and talking circuit over the metallic circuit will not be interrupted. When the duplex circuit is utilized, the coils, being parallel wound, present no great impedance. While transmitting through the coil jointly to each side of the metallic circuit, the ohmic resistance is but 500 ohms from the center of the coil to the metallic line. The drops at the switchboard are wound to 500 ohms.

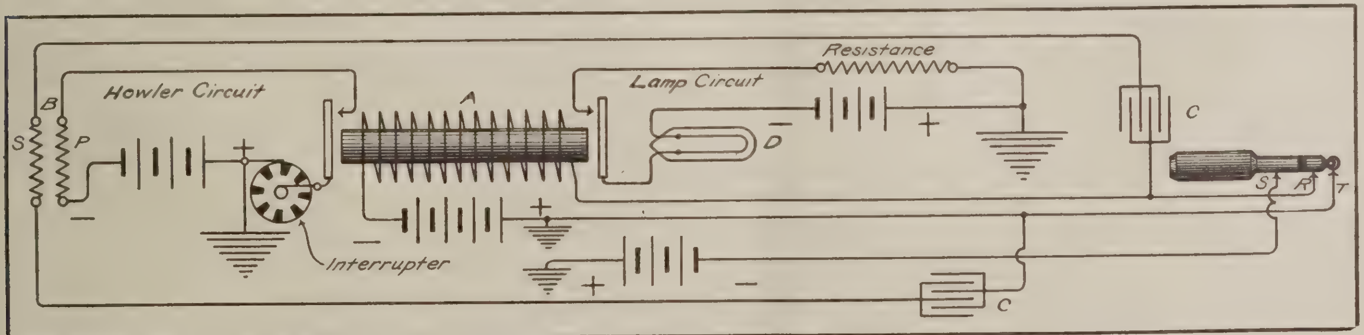
A NEW HOWLER CIRCUIT

By Chas. Ameer.

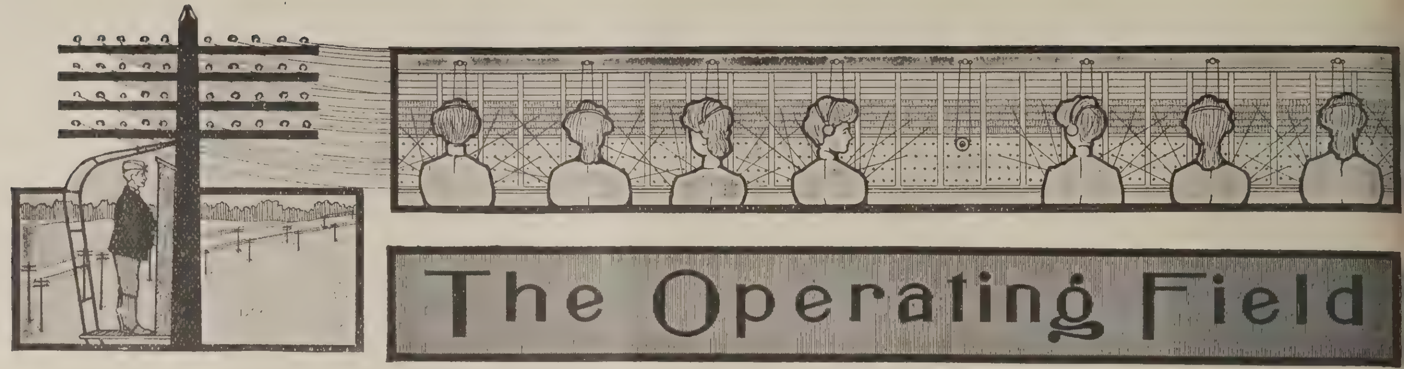
In nearly all telephone exchanges having less than 5,000 subscribers the night operating force consists of a chief night operator and one, two or three assistants. Very few such exchanges have a night switchboard man, or an electrician, and few night operators know enough of the art of telephony to do any testing or clear any trouble. In a common battery exchange from one to ten lines and from one to forty subscribers are put from service each night by some careless subscriber leaving his receiver off the hook

In a case of this kind, the night operator may ring once or twice on the line and if she fails to raise the culprit party the line is plugged up and left out of commission for the night. To furnish relief the writer has designed the howler circuit, which is here illustrated. In the diagram *A* represents a resistance also used as a relay; *B* represents an induction coil, *C* and *c* are condensers, *D* is a small switchboard lamp. When a subscriber leaves his receiver from the hook and the line lamp lights, the night operator first tries to call the subscriber back to the telephone by ringing on the line. Failing in this the line is immediately plugged up upon this special trouble cord. The sleeve connection is similar to that of any common battery exchange and actuates the cut-off relay which extinguishes the line lamp.

A battery connected in series with the resistance *A*, is placed across the *tip* and *ring* strands of the cord. This resistance prevents the short-circuiting of the battery and also acts as a relay and closes two circuits. This battery circuit is open until the tip and ring are crossed by the subscriber's hook switch being up. (The receiver off the hook). As soon as the plug is put in the jack of the lighted line the relay, *A* is actuated closing the circuit of the lamp *D*, and that of the howler. As long as the receiver is off the hook the lamp *D* stays lighted and the howler sends its sound out on the line.



As soon as the subscriber hangs up his receiver the battery circuit is opened, the line lamp is extinguished, the special plug is taken down by the night operator and the line is at once put into commission. The condensers *C* and *c* are necessary, as without them there would be a closed circuit across the *tip* and *ring* and the lamp would be kept continuously lighted.



The Operating Field

NORTH ELECTRIC WINS SUIT AGAINST WESTERN ELECTRIC COMPANY.

JUST as this number of THE AMERICAN TELEPHONE JOURNAL is going to press, we are in receipt of a telegraphic report that the North Electric Company, Cleveland, Ohio, has won another important suit against the Western Electric Company, which is the manufacturing branch of the Bell Telephone Company.

The suit was on patents 357,538, issued to Scribner; 488,033, issued to Scribner and Warner, and 552,729, issued to Scribner, and covering a combination of long and short springs in switchboard spring jacks.

The opinion was handed down by Judge Francis J. Wing, sitting in the United States Circuit Court for the Northern District of Ohio. The case was the Western Electric Company *vs.* the North Electric Company.

The Western Electric Company alleged that the North Electric Company was making switchboards containing spring jacks which were an infringement on the above mentioned patents controlled by the complainant company.

Judge Wing, in his decision, dismissed the bill of complaint and awarded judgment for costs against the complainant. Barton and Tanner appeared for complainant and Laurence for the defendant.

An adverse decision in this case would have been very disastrous to Independent telephony, inasmuch as all modern switchboards embody the principle of long and short springs in spring jacks. If the case had been decided in favor of the complainant it is probable that all Independent switchboards would have had to have been rebuilt.

CUYAHOGA'S PROFIT-SHARING PLAN.

CHRISTMAS presents for employees of the Cuyahoga Telephone Co., Cleveland, Ohio, will be somewhat belated, but will be quite worth while waiting for. The employees are making many calculations each month, as the company issues its monthly statement, trying to figure out what their share in the distribution will be.

Last July President Dickson made a profit-sharing offer to the employees, the test to be on business done for the last six months of the year, the share for each employee being estimated as equivalent to an advance of 10 per cent. in salary. In consideration of this, and in the hope that it might be so successful, the company would feel warranted in maintaining it as a permanent feature of its business, President Dickson sent to all employees a letter urging special efforts in their respective departments, to the end that the service might show improvement and growth and that officers and employees in combined effort might demonstrate the business results of closer organization and systematic team work.

The letter was effective in awakening a deeper interest in the work on the part of the employees and the company has been operated with fewer of the small annoyances than ever before. The earnings have shown an improvement, have advanced monthly and the surplus fund, from which the profit-sharing was to be made, has been gradually piled up higher and higher.

The results already show the complete success of the venture. There has been better work and employees have shown more zeal as they realize that from the success they help produce comes a share of the profit as their reward.

It is impossible to tell what amounts the various employees will get, but the plan has been a success and the officers are glad it was made. It will take some time after the close of the year to check the accounts and make the distribution, but the employees will be quite willing to wait for it. It is probable it will be retained as one of the features of the management to aid in the development of the company's business and the betterment permanently of the service. The plan is expected to show exceptional results during the new year, when the company gets its new switchboard in and begins its active campaign for the development of business.

STRENUOUS COMPETITION IN BALTIMORE.

THE Maryland Telephone and Telegraph Company, the Independent company in Baltimore, Md., has cut some of the wires of the Bell Company. Harry W. Webb, general manager of the Maryland Company, sends the following explanation to THE AMERICAN TELEPHONE JOURNAL:

"Our company has a line of poles on Pine street which was erected some two years ago, and carries in the neighborhood of 20 aerial wires and a cable. This line was erected under the proper authority of the city. The Chesapeake and Potomac Telephone Company recently erected a line through Sarah Ann street. At the crossing of Pine and Sarah Ann streets, where this line crosses the lines of my company, instead of following out the usual custom of telephone and telegraph companies throughout the United States wherever it becomes necessary to cross one another's lines, of either going above or below the company which already has the right of way on the intersecting street, they deliberately sandwiched their wires through the wires of our company, putting out of service a number of our subscribers. The wires which they ran were dead wires, and were only put up across Pine street in order to get a right of way and interfere with our service.

"The only resource left to the Maryland Company was to cut these wires and place an injunction upon the Chesapeake Company from replacing the same, which was immediately done. It has been a custom between the employees of the telephone, telegraph and electric light companies to use throughout the city and county each other's poles for a short distance in order to reach subscribers. While the officials of the Maryland Telephone Company were aware of the fact that the C. & P. Co. had, and have, wires on a number of its poles throughout the county and the city, it has shut its eyes to this custom of its employees, knowing that they had wires on the Chesapeake poles. Recently, however, the Maryland Company has had a number of complaints from its subscribers that their telephones have been disconnected, and upon investigation have found that the C. & P. Co. had cut the wires where the Maryland Company's employees had made contacts on their poles in accordance with the custom above stated."

In conclusion, Mr. Webb states that his company now has about 8,300 telephones in service locally and long distance lines to Philadelphia and York, Pa., giving connection to all eastern Pennsylvania. The company has recently opened up a new line to Hagerstown, Md., and expects soon to have a line completed to Cumberland, Md., which will open up Pittsburg, Pa., and the West.

Mr. Webb. says the service of the Maryland Company in Baltimore is of such quality that it is impossible for the Bell to make headway against them, notwithstanding the fact that the Bell Company is offering cheap telephones and is installing unguaranteed pay-stations throughout the city.

CENTRAL UNION AGAIN BITES THE DUST.

FOR some time past the Business Mens' association, of Jonesboro, Indiana, have been considering the telephone situation at that place. A meeting to determine their action was called recently, and the deep interest they felt in the subject was shown by an unusually large attendance, nearly every member being present. Several gentlemen were also present upon invitation of the association, among them being O. Rex, of North Manchester; Mr. Morris, of the Independent exchange at Lafontaine; Woodward and Haymaker, of Defiance, Ohio, who built the exchanges at Gas City and Jonesboro; A. V. Overshiner, of Chicago, representing the Swedish-American Telephone company, who furnished the switchboard and telephones for those exchanges, and Hon. G. A. H. Shideler, who is interested in the United Telephone company of Marion.

After an informal discussion of the situation, participated in by all the gentlemen present as well as the members of the association, the action of the business men of Jonesboro was unanimously decided on and the president and secretary were directed to formulate a report in accordance with that decision which they did by adopting the following report:

> Whereas, the Central Union Telephone Company has submitted to the Business Men's Association of Jonesboro a proposition which provides in substance that if the members of this association will adopt the Central Union telephone and discard those of the Home Telephone Company, which we are now using, that the Central Union will furnish residence telephones in this city at a slight reduction from the rate we now pay the Home Company, and will furnish free service to the members of this association for a limited time, and at a slight reduction thereafter from the rates we are now paying, and will also permit free service to all the Central Union patrons in Grant County; and,
>
> Whereas, this association has had said proposition under consideration for some days and investigated the same as thoroughly as the time and facilities at our disposal would permit, and as a result of such consideration and investigation we find as follows:
>
> First. For several years the Central Union was the only company giving telephone service in our city, and the service they always furnished was extremely poor and unsatisfactory, the number of patrons was small and the cost very high.
>
> Second. The Home Telephone Company about one year ago began furnishing us service through their new exchange furnished with Swedish-American equipment and long distance telephones, and their service has always been much better than was ever furnished by the Central Union exchange, with a patronage about twice as great as we could formerly reach through the Central Union exchange, and at a cost much below what we formerly paid.
>
> Third. We find that in all the surrounding towns and counties the Independent telephone systems with which the Home Company is connected have a much larger list of patrons than the Central Union now has and that in the counties adjoining our own the Independent telephones outnumber the Central Union about ten to one; therefore,
>
> Resolved, that the proposition made to this association by the Central Union be rejected and that we continue our support and patronage to the Home Telephone Company of Gas City and Jonesboro
>
> David Holmes, Secretary. E. N. Pierce, President.

Elam H. Neal, Jonesboro manager for the Home Telephone company, was much gratified by the action of the merchants.

IOWA INDEPENDENT CONVENTION.

THE second annual meeting of the Western Iowa Independent Telephone Association was held recently at the Grand Hotel, in Council Bluffs, Iowa. The principal business was a discussion of plans to secure Independent connection with Council Bluffs, the topic being: "How can we persuade the people of Council Bluffs to allow 10,000 telephone subscribers in southwestern Iowa to talk with them?" The discussion was opened by H. W. Cutshall, of Shelby, who said in part:

"When a merchant in a town tributary to Council Bluffs takes up his telephone receiver and calls for Council Bluffs and is informed that there is no connection with this town, if he is in a hurry for his order he will naturally ask for connection with Sioux City, Des Moines or some other convenient jobbing point, and Council Bluffs will thus lose much trade. The merchants are becoming to use the telephone more and more in sending in their orders. Many of them cannot afford to wait for the drummer to come around and take the order, and many good orders are so rushed that they will telephone rather than stand for the delay caused in writing. Of course, many of the towns have the Bell toll stations, but this necessitates the customer running over to the booth every time he wants to call, and waiting around, sometimes for half an hour, before he gets the party. In a few of the towns the Bell Company has exchanges, but in most towns where there are both, the Independent telephones are vastly in the majority."

M. A. Reed discussed the subject, "How can we best secure the construction of long distance copper metallic toll lines in southwestern Iowa?" and P. C. Holdoegel, "Rules for Rural Lines and how to enforce them."

It was unanimously decided to call the organization the Southwestern instead of the Western Iowa Independent Telephone Association, and the officers elected for the ensuing year were as follows: President, H. A. Kinrey, Woodbine; vice-president, P. C. Holdoegel, Rockwell City; secretary, J. F. Glenn, Denison; treasurer, A. T. Whittle, Harlan; executive committee, H. W. Cutshall, Shelby; W. B. Swaney, Audubon; M. A. Reed, Woodbine; E. E. Piper, Avoca.

Among those present were the following representatives of Independent lines in this section of the State: H. A. Kinney, M. A. Reed, Woodbine Telephone Company; J. F. Glenn, Crawford County Telephone Company; W. B. Swaney, Audubon County Telephone Company; A. T. Whittle, E. E. Piper, Harlan-Avoca Telephone Company; P. C. Holdoegel, Central Union Mutual Telephone Company, Rockwell City; H. W. Cutshall, C. R. Benedict, Shelby Independent Telephone Company. From Nebraska A. M. Munn, of the Nebraska City Telephone Company, and H. Herndon, of the Ashland Telephone Company, were in attendance, besides a number of representatives of supply houses.

NEW YORK CLEARING ASSOCIATION.

THE certificate of incorporation of the Independent Telephone Clearing Association of New York State has been recorded. The purposes for which it is formed are clearing and adjusting accounts for, with and between telephone companies located in the State of New York and other States. Its capital stock is $5,000, but the corporation will begin business with $500. Its principal office is to be in Sherman, N. Y., and its duration is to be perpetual. The directors are Fred. N. Randall, Ripley; Walter H. Homewood, Sherman; Herbert H. Corbett, Sherman; Otis L. Ingalls, Westfield; George S. Beebe, Silver Creek; Ralph H. Hall, Fredonia; Thaddeus S. Lane, Jamestown; George W. Appleby, Watts Flats; Arthur R. Maytum, Fredonia; Edgar J. Griswold, Mayville.

NEW MANAGEMENT AT GLASGOW, SCOTLAND.

JOHN MACFEE, assistant manager of the Glasgow, Scotland, Corporation Telephones, has been appointed general manager in succession to Mr. Bennett. The new manager is well qualified to undertake the responsibilities of the post, having ben a telephone engineer since he first entered business. Mr. Macfee is a native of Paisley, and was trained in the science of electrical engineering at the Technical College, Bath street, where he carried off the honors prize, the silver medal of the City of London Guilds, and also the John Pender gold medal and the diploma of the college. He studied later at Owen's College, Manchester. His practical experience was gained in Hull, Sheffield, and Bolton; and, since settling in Glasgow, he has visited Stockholm, with a view of widening his outlook on the development of the Glasgow system.

The Editor's Page.

WAS AN OBJECT LESSON NEEDED?

IF an object lesson were needed to show to what extent the country has emerged from the shadow of the great Bell telephone monopoly, the recent convention of Independent operators and manufacturers at Chicago was sufficient. For over twenty years, through trickery and deceit, the Bell crowd were able to fasten their unholy monopoly on the public. Unlimited capital, unlimited cunning, coupled with a dense ignorance of the principles of magnetism and telephony on the part of the courts, not excepting the Supreme Court of the United States, did the work. From the time that Bell hoodwinked four justices of the Supreme Court into the belief that he had actually discovered something new, the constant effort of the Bell outfit has been to cheat the courts and defraud the public. In the famous Berliner case, whereby the Bell Company made a vicious effort to continue its monopoly from 1891, the attempt was defeated by a United States court.

Again, the Bell outfit tried to cheat the court in the Carty case, and succeeded until it became known that it had gobbled up the Western Electric Company, which brought the suit, and was performing the great acrobatic feat of appearing on both sides of the case at the same time. The Bell crowd are once more up to their old tricks. Defeated in the Berliner and Carty cases and confronted by an Independent telephone movement which is gradually driving them out of the middle west, they have finally grabbed the Kellogg Switchboard and Supply Company, once an ally of the Independents, and the old record of trickery and chicanery is being maintained. We may now look for more Carty cases and further frantic efforts to fool the people and the courts and re-establish the waning fortunes of this once all-powerful monopoly.

The last attempt of the Bell Company to strangle competition must fail absolutely. The eyes of the people have been opened by the record in the Berliner, Western Union and Carty cases, and by the persistent warnings of the Independent telephone journals. Their eyes will probably be still further opened by court proceedings and decisions before the Bell Company concludes to accept the inevitable and build its business on merit and service, rather than unjust patent claims, trickery and sandbag methods. Had the Bell people been able to keep secret the fact that they own the Kellogg Company, some harm might perhaps have resulted. But now that the fact is understood and is not denied, no considerable number of Independent operators will walk into so bungling a trap.

"What difference does it make who owns the stock of the Kellogg Company?" they say in effect. "The equipment we make is not affected and that is what you are buying." But this specious argument does not fool anybody. Were there no reasons why an Independent operator should not patronize a Bell concern, the fact that so doing practically gives his competitor an intimate knowledge of the financial standing and backing of his company is sufficient. When an operating company goes into the market to buy goods the manufacturer very properly looks into the credit and financial standing of the would-be purchaser, and looks into it thoroughly. This is the first essential of business. No manufacturer is going to furnish a concern with goods to cost thousands of dollars perhaps without a thorough and intimate knowledge of that company's affairs.

WE THINK THE PEOPLE'S EYES ARE OPENED.

No one will dispute this. But what if the Kellogg Company comes to know all intimate affairs of the Independent operator; that is, what if the Bell crowd, who own the Kellogg Company, come into possession of this knowledge, for that is virtually the same thing? Would there be anything to prevent that knowledge from getting to the manager of the local Bell Company which is competing with that Independent? That certainly would be the logical outcome of the situation and conditions. What a club that knowledge could be made in the hands of an aggressive and unscrupulous competitor! Through banks and financial institutions, through business and even social relations, in numerous ways the still powerful Bell Company could bring a great influence to bear on the Independent and their friends which would prove a handicap, to say the least, and might effectually ruin the opportunities for business. As a matter of fact, honest people should give the unholy Bell monopoly a blow wherever it shows its head. Monopoly of a natural right, like the freedom of speech, is bad enough, but monopoly, based upon fraud and maintained by trickery, is insufferable.

THE ABHORRENCE OF 'PHONE.

'PHONE is an abhorrent and indefensible abbreviation of a sound and descriptive word—telephone. 'Phone is a newspaper reporter's vulgarism and should not be tolerated by telephone men. It is an abbreviation that has not a leg to stand on, nor a head to see with, nor any good or sufficient reason for its existence. It should be suppressed with a stern hand by all who think that telephony is a dignified and responsible profession. 'Phone is neither descriptive nor euphonius. It grates on the sensitive ear almost as roughly as an obscene word. We may be in a great hurry these days, and may need short cuts in language as well as in thought and action, but we are under no necessity to maim, eviscerate and deform, turn into a bleeding, dripping mutilation, the name of one of the greatest inventions of our time.

It may perhaps be unfortunate that the telephone could not have been given a shorter name, since it was to become an article of general household use. But since it was very properly christened telephone do not let us uglify and vulgarize it by giving currency to such a senseless and hideous nickname as 'phone. No one has attempted to call a telescope a 'scope, or a telegram a 'gram, or an umbrella a "brel." Why then inflict such a base indignity on one of the most beautiful, most delicate and most profoundly useful inventions ever presented to mankind as to call the telephone a 'phone.

We detest the very sight of this headless abortion, with its inane apostrophe where the ambitious and distance-piercing headword should be. Telephone, a far-speaker; *fernsprecher,* as the Germans call it. Far better even the relatively clumsy "far-speaker" than the vacuous, meaningless, vulgar and horrid 'phone. Telephone men, stamp out 'phone whenever you hear or see it. Do not let your employees say or write 'phone. Let us all work for the telephone, not for a loathsome vulgarism like 'phone.

PROPERTIES OF HARD DRAWN WIRE

By Francis W. Jones, *in Telegraph Age.*

THE great strength which is obtained in hard drawn copper wire (of over 60,000 pounds breaking strain to the square inch, which is very close to ordinary iron), with over six times better electrical conductivity than iron, with its almost complete immunity from oxidation and corrosion, ensuring a negligible depreciation, and its small electromagnetic inertia as compared with iron, are qualities which have made the use of copper wire very important to telegraph and telephone companies, and to meet the necessity of systems of communication requiring more rapid signals than Morse, the value of copper wire to telegraph companies for overhead construction will still be very greatly enhanced. But the full value of such wire, particularly its mechanical qualities, can only be secured by its most intelligent and careful construction and maintenance, from the fact that the strength of the wire lies entirely upon its surface, and that to secure the utmost tensile strength the wire has to be tempered to the verge of brittleness.

When telegraph wires were first strung upon poles, the length of the spans, the distance of wires apart, and the sags given, were decided purely by mechanical and financial considerations. The length of span having been fixed to require as few poles per mile as possible, the sag was restricted to such a distance that the wires would not swing together in the wind. Modern construction has been determined largely by the same consideration. An exception was made by the American Rapid Telegraph Company and the original Postal Telegraph Company, several years ago, in placing their wires farther apart to obviate the effects of electrostatic lateral induction, but on the discontinuation of the rapid systems then used by these companies, the intermediate space on the cross arms was used for other wires, and within recent years the tendency has been to place the wires still closer together, and this has become possible by reason of the shortening of the spans by a greater number of poles necessary to support the increasing load of wires.

Notice was early taken by engineers of the temperature effect upon wires, as it was found that when they were put up in a high temperature, with but little sag, that they would snap during cold weather, so the engineers furnished formulæ according to which sags should be given to wires of different lengths of span when erected at various degrees of temperature.

It is shown by Mr. John Gavey, the engineer-in-chief of the British Postal Telegraphs, page 336, vol. XXXI of the Journal of the Institution of Electrical Engineers, London, that a hard drawn copper wire, when under a very slight stress, acquires a permanent set if the stress be maintained sufficiently long, and that a wire nearly No. 12 B. and S., with a breaking strain of 490 pounds, loaded with 110 pounds, recovered its original length upon removal of the load if it was not continued too long, but if the load was kept on for twenty-four hours a permanent elongation of one-sixty-fourth of an inch in three days and three-sixty-fourths of an inch in two weeks. It is shown that hard drawn copper wire will not respond to its natural elasticity after being loaded for a few hours, and that the elasticity has been killed, so to speak, or the wire fatigued and its natural elasticity disappears.

I erected on May 7 last a new No. 9 B. & S. hard drawn copper wire, between fixed supports, 124 feet 1 inch apart, with a sag of four inches, which equalled a stress of about 231 pounds, or roughly one-third of the breaking strain of the wire. The temperature at the time was sixty-five degrees Fahrenheit. On July 10, temperature 102 degrees Fahrenheit, the sag was eleven and one-eighth inches, and later in the day, at ninety-three degrees Fahrenheit, the sag was nine and three-eighths inches. On August 6, at a temperature of sixty-five degrees Fahrenheit, the same as when the wire was erected, it showed a sag of nine inches, or five inches in excess of the sag that was given it when first put up. A new hard drawn copper wire has a natural elasticity which permits it to elongate a very trifling amount (about one-tenth of one per cent), when under not exceeding two-thirds of its normal breaking strain for a short period of time, but when the strain upon the wire, or the period of time increases, then the wire permanently elongates.

When a short piece of the wire has been placed under stress to the limit of its breaking strain, of about 670 pounds, for a No. 9 B. & S. gauge, it breaks, and the two pieces measured will be found to have sustained a permanent elongation which, according to the temper of the wire, generally ranges between one and two per cent, and a piece of the wire, 150 feet long, when subjected to a strain of 670 pounds, at the same rate of elongation, would stretch from eighteen to thirty-six inches before breaking. If such an elongation were possible to take place between telegraph poles, it would allow the wire a sag of nine feet or over. Hard drawn copper wire may be permanently elongated nearly up to its maximum limit of elongation, and it will require as much strain to break such a piece of elongated wire as if it had never been stretched.

What actually happens, therefore, seems to be this: Suppose a wire, when new, is given a sag of nearly seven and three-quarter inches, between poles 150 feet apart, at eighty degrees Fahrenheit, the wire then has a stress of about one-quarter of its breaking strain and the length of the wire is 150.0072 feet. Should the temperature fall sufficiently, this wire will contract so that it will be subjected to a very heavy strain which will cause it to elongate unless the wire contains weak spots or kinks or places that have been slightly abraded or indented at the tie wires, in which case the wire will break at such weak points.

When this is the case the weak spots in the wire will, of course, prevent it from becoming permanently elongated beyond what it naturally elongates upon the poles, as demonstrated by Mr. Gavey. Should the wire have no unusual weak spots it will elongate sufficiently to prevent the stress in the wire raising to its breaking point. It is evident that if linemen were to adopt the practice of taking up the sags by cutting out pieces of wire, that the time would soon arrive when the wire had stretched to the limits of its natural elongation and would break under the first stress imposed by low temperature or other cause.

THE BURLINGTON TELEPHONE SYSTEM.

AFTER several years of labor a complete telephone service between Chicago and Burlington, Iowa, was opened recently by the Chicago, Burlington & Quincy Railroad. The entire system is owned and will be operated for the exclusive benefit of the Burlington road. Over it the company expects to transact the bulk of its business in every line, putting an end to the sending of thousands of telegrams and letters. It is the first stretch of what will be a telephone service that will connect all stations on the system. On the Chicago-Burlington line just opened there are 332 individual telephones, connected with seven private exchanges of the company. In Chicago there are four exchanges, one in the general offices, Adams and Franklin streets, one in the local freight offices, one in the dispatchers' and terminal superintendent's office, Canal and Sixteenth streets, and the fourth in offices at the Western avenue yards. With these exchanges there are 200 telephones, reaching every office of the company in the city.

In Aurora another private exchange connects with seven instruments. In Galesburg the sixth private exchange gives service to eighty telephones, and at Burlington the exchange serves forty-five instruments. When finished the complete service will include 2,500 telephones. The estimated cost of the work is $300,000. The only thing the railroad does not own outright are the telephone instruments, which are leased. All of the block signal stations between Chicago and Burlington have been supplied with telephones.

THE TELEPHONE IN THE COURTS

Conducted by A. H. McMillan

Readers are invited to submit questions on any point of telephone law. They will be answered and explained by Mr. McMillan on this page.

A LICENSE TAX MUST BE REASONABLE.

IN your issue of November 28, 1903, you stated in substance that a license tax of $1 per pole upon the line of a telephone company was valid. Could the city make that fee $5 per pole and the tax still be legal? T. A. M.

THE legality of any license tax on poles depends upon local conditions. The license fee must be reasonable, but may be great enough to cover any expense incurred by the municipality because of the existence of the telephone system in the city. In a case where the reasonableness of such a license fee was questioned, the city was permitted to introduce evidence to show an increase in the force and apparatus of the fire department rendered necessary by the maintenance of the poles and wires, and also that extra meetings of the council were required for the purpose of regulating their construction and maintenance. City of Philadelphia v. W. U. Tel. Co., 32 C. C. A. 253, 89 Fed. 454, 461.

STATE LAW ALWAYS SUPREME

THE State law gives us the right to construct our lines along any of the streets and highways of the State. The city charter says the Council may regulate telephone poles and wires in the streets. Although we have been in business here for five years, and have had our poles in the streets all that time, a resolution has been introduced into the Council declaring the poles and wires a nuisance and ordering their removal. Can you help us with any authorities on the question? S. W. CO.

THE case of Telephone Company *vs.* Benton Harbor, 121 Mich., 512, is a good case on the question. It is there held that the regulation the charter intended the council to exercise was merely supplementary to the provisions of the State law. The council cannot declare the poles of a company operating under such a State law a nuisance; all it can do is to prescribe how they shall be located and established.

SETTLEMENT MADE IN WELL KNOWN CASE.

THE suit of Manning *vs.* the Chesapeake & Potomac Telephone Company (Washington, D. C.) has been settled by the company and the Telephone Subscribers' Association, which has been conducting the litigation for the complainant. All the suits are dismissed and the company has paid a sum of money that enables the association to return to each subscriber the full amount of his payments. The reason for the agreement was largely that through changed conditions of service and the altered policy of the company most of what the association sought to accomplish was secured.

CROSS-ARMS TO PREVENT INTERFERENCE.

THE case of the Connotton Valley Telephone Company *vs.* the Central District and Printing Telegraph Company, tried in the Harrison County Court, Ohio, was a suit to compel the removal of the poles of the latter company from their present location near the city of Jewett. The plaintiff had built its line after securing rights from the village and the land owners along one side of the road. The defendant had previously secured a right of way along one side of the public road, and was proceeding to build on the same side of the road the plaintiff was occupying. The plaintiff insisted that, its occupation being previous, the defendant should not be permitted to have a joint occupation with it, but should be compelled to cross through the fields.

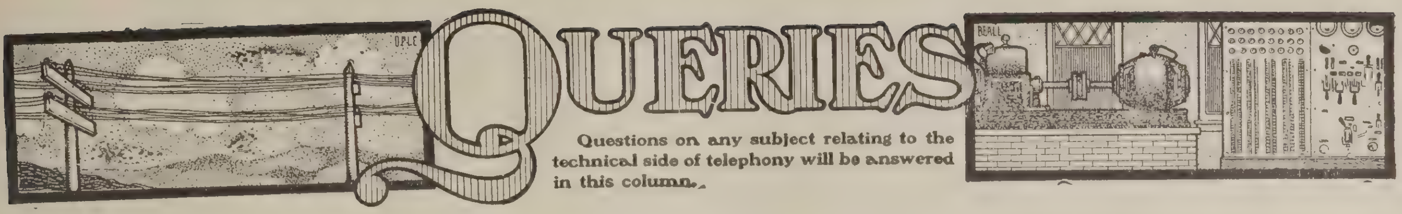
The court held that the plaintiff could not claim the exclusive right to the road side and permitted the defendant to complete its line upon placing cross-arms on its poles so as to keep the wires of the plaintiff's line in proper position and prevent in this way interference of the lines of the two companies. The evidence showed that the defendant companies' poles were some ten feet higher than the poles of the plaintiff and that if the plaintiff's wires were guarded in this way by cross-arms supporting insulators for the wires of the plaintiff's line, there could be no interference of which the plaintiff could complain.

SUBSCRIBER'S RIGHT TO PRIVATE SWITCHBOARD.

A SUIT that will determine the right of a telephone subscriber to install a private switchboard of his own with an extension set of telephones, batteries, etc., and compel a telephone company to connect therewith and render service, has been commenced by the law firm of Beach & Beach, of Chicago, Ill., against the Chicago Telephone Company.

Beach & Beach, the complainants, had for some years a telephone instrument belonging to the company, installed in their main office or waiting room. There are in connection with the main office eight private offices occupied by the firm, their clerks and subtenants. The complainants desired extension telephones upon the desks of each of these private offices and applied for them to the telephone company. The only terms on which the company would install the extension instruments were: $72 per annum for two trunk lines; $12 per annum for a switchboard; $12 per annum for each extension instrument, and in addition to the foregoing, five cents for every outgoing message, which complainants allege, would amount to nearly $500 per year, making a total of about $600. They had been previously paying $125 per year for one telephone. The complainants thereupon purchased from the Stromberg-Carlson Telephone Manufacturing Company, a complete extension set of telephones, with batteries, switchboard, etc., and then applied to the Chicago Telephone Company for permission to attach the switchboard connecting these instruments to the wires of the company in their offices. The company refused the request, it is alleged, and threatened if the complainants made the connection to discontinue their entire telephone service. Complainants made the connection and filed a bill setting forth the facts and secured an injunction restraining the defendant company from disconnecting the switchboard from the wires of the Telephone Company, and from interfering with or disconnecting their telephone service as it had previously existed.

The basis of complainants' claim in the suit is that the Telephone company is a public service corporation, bound to furnish to each subscriber all the conveniences it furnishes to any subscriber, and this at a reasonable cost; and if the company refuses to furnish such conveniences or service to any subscriber, except upon exorbitant terms, the subscriber is entitled to supplement the service with his private instruments. Complainants further assert that the convenience furnished them by the use of their private extension instruments imposes no additional burden on the telephone company either in answering more calls or in expense of operation, but in fact is a convenience to the company as well as themselves, and is an economy in saving of time to the company. Complainants are represented by Messrs. Smoot & Eyer and Julian C. Ryer.



QUERIES

Questions on any subject relating to the technical side of telephony will be answered in this column.

A CONTINENTAL RECEIVER.—(252.)

What is the advantage in using receivers with several curved magnets like they use in Europe, a cut of one of which I send you (Fig. 252), that was clipped from a European electrical paper. L. I. C.

There is no advantage in the receivers which you describe. On the contrary, the bi-polar receivers manufactured in America are equal to, if not superior, to anything made in Europe. Such receivers as you illustrate were early forms which were made when there was little or no knowledge regarding the proportioning of receivers, and were constructed with the hope of obtaining a telephone which should be more powerful than the early instrument manufactured by Prof. Bell.

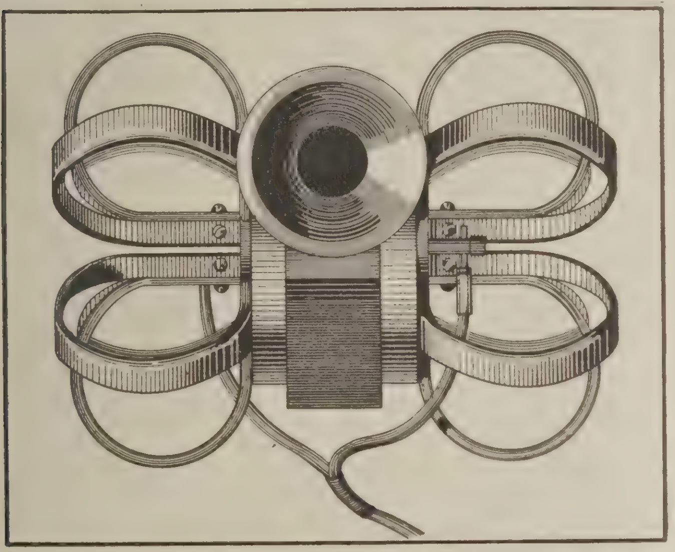


Fig. 252.

RESISTANCE QUESTIONS.—(253.)

(1) Is there any method of calculating resistance of a circuit when only the drop of potential is known?

(2) Is there any difference between the resistance of a non-inductive circuit and an inductive one to voice currents or inductive effects, supposing both to have the same apparent ohmic resistance, aside from that due to retardation? H. R. F.

Answer to No. 1, No.

Answer to No. 2. Every electrical circuit offers a certain opposition to the transfer of electricity over it. This opposition is broadly termed impedance, and impedance is made up of two quantities, one which is termed *"ohmic resistance"* and is the opposition which is offered by the circuit to currents which are absolutely uniform and unvarying. The other is called reactance, and is the opposition which is offered to varying or unsteady currents. There is no circuit which does not possess both of these qualities in some degree. The *apparent* resistance of a circuit is the vector sum of the ohmic resistance and the reactance, and is found in the following manner (Fig. 253): Draw a straight line $A B$, horizontally to any convenient scale. Make AB proportional to the ohmic resistance. At the point B erect a perpendicular BC, and make it equal to the reactance to the same scale. Join A and C. Then the line AC will represent the impedance or apparent resistance of the circuit. As voice currents are always pulsating or alternating in character the opposition of any circuit to such currents is equal to the impedance of the circuit, and in telephone work the impedance is usually very much greater than the ohmic resistance.

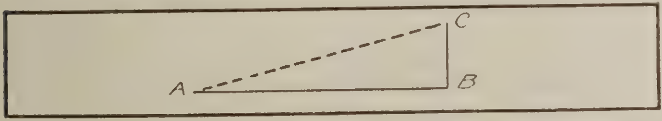


Fig. 253.

TO QUIET A NOISY LINE.—(254.)

A telephone man told me that it helped to take the noise off a grounded line if a coil with an iron core was connected between the line and ground at the center of the line, like I have shown in the enclosed sketch (Fig. 254). Do you think this would help to make the line quiet? The line that I want to try it on is 18 miles long, and is very noisy. E. M. B.

A coil, such as you illustrate, is sometimes attached to a telephone line as an aid to making it quiet, because the coil provides a leak to ground. Sometimes a noisy line is caused by static induction and sometimes by the actual passage of a current over it. If static induction is the cause of the trouble, or if the circumstances are such that the current causing the noise tends to leak to ground, the introduction of such a coil will often improve the service. The coil operates as follows: As it has a very high impedance, owing to the number of turns and the magnetism of the current, the voice currents are not shunted. On the contrary, a static charge, or a current tending to flow to ground of low frequency will have little difficulty in traversing coil and escaping from the line.

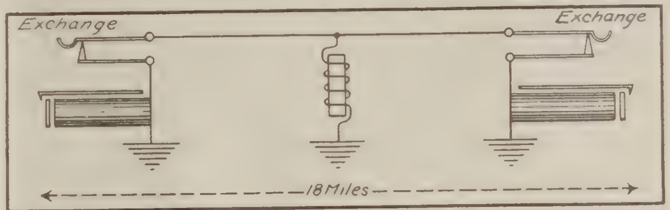


Fig. 254.

CORRECT WAY TO SET GUY STUB.—(255.)

Which is the best way to set a guy stud, that shown at A (Fig. 255), or that shown at B? Please give reasons. R. A. L.

The most common way of setting a guy stub is that shown at A in the accompanying illustration. In such cases the stub merely consists of a stick planted in the earth. If the guy stub is set as shown at B, then the tension upon the guy tends to pull the stick out of the ground. A guy stub may be set in this manner provided it is furnished with a cross piece bolted to the stub, which is set in the ground. This prevents the guy stub from being withdrawn. On the whole, the method at A is preferable.

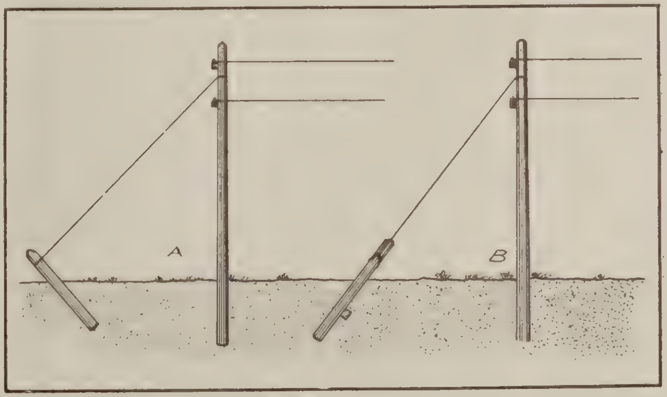
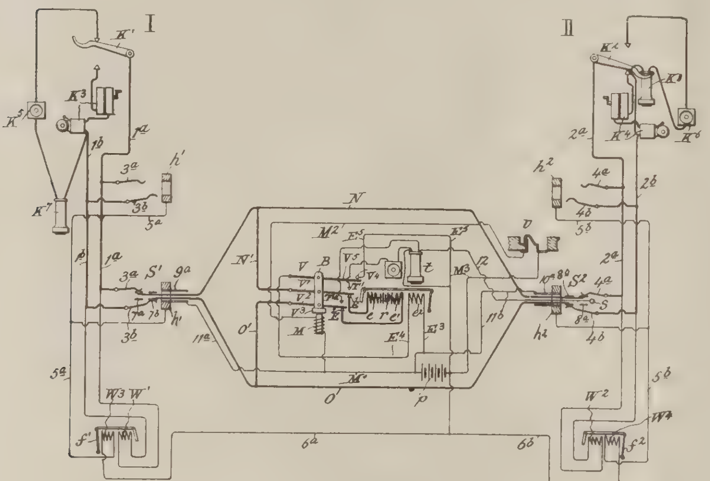


Fig. 255.

PATENTS ISSUED

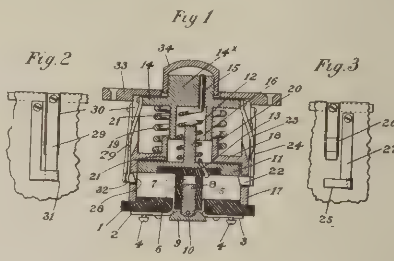
TELEPHONE SYSTEM.

George Ritter, of Stuttgart, Germany, patents (No. 745-523) an improved switchboard circuit. The object of this circuit is to provide a system which will render automatic the interchanging of the operator's telephone and the clearing-out signal of the desired subscriber. The circuit is shown in the figure. This circuit is perhaps best understood by describing its operation. Assume that substation *I* desires to communicate with substation *II* and has called the central station. The operator plugs with the answer-plug *S'* into the jack of the line to station *I*, which results in placing the operator's telephone *t* in circuit with the substation *I*, the talking-circuit being from said station *I* over the lines *la lb*, thence over jack-springs *3a 3b* and plug-terminals *7a 7b*, the plug-conductors *N* and *O*, over the bridge conductor, the switch-levers *V'* and *V2*, thence to the contact-points *T'* and *T2*, and thence through the central telephone. At the same time the insertion of the plug *S'* in the jack closes the circuit between the conductors *11a* and the jack ring *h'*, whereby the restoring coil *W3* of the calling-annunciator is energized to restore the drop, the circuit being from battery *p* along a part of conductor *M'*, thence over conductor *11a*, terminal *9a* of the plug *S'*, through the jack-ring *h'*, over conductor *5a*, coil *W3*, and conductor *6a*, back to the other pole of the battery *p*. The number of the desired station being obtained by the operator, the calling plug *S2* is inserted into the jack of the line to be called, in this case assumed to be the line to station *II*. The removal of the plug *S2* from its holder *U* allows the switch to close the local circuit over conductors *M' M2 M3* and magnet *M*, thereby energizing said magnet and causing it to attract the armature whereby the main-circuit changer is moved to cut out the central station and cut in the main coil of the clearing-out annunciator. This position of the switch *V* is shown in the drawing. As soon as this is done the battery *r* energizes the circuit to substation *II*, and thus rings a call at said substation. The call continues until the subscriber at said substation removes the telephone receiver *K8* from the hook-lever *K2*, whereupon the call bell is cut out in the usual manner. The connection is thus completed between substations.



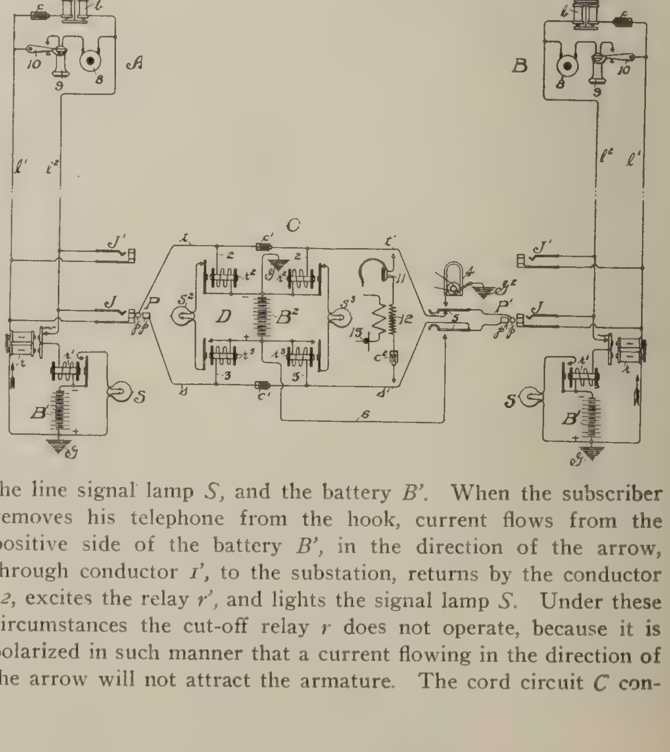
IMPROVED PUSH BUTTON.

Charles Felt, of Chicago, Ill., patents (No. 744,736) and assigns to the Electric Specialty Co., of Chicago, an improved push button. This invention is shown in Figs. 1, 2 and 3. Fig. 1 is a section. The screws, *4, 4*, are used to attach the conductors of the electrical circuit to the plates *2* and *3*. There is a sliding piston, *6*, that carries a metal contact piece, *9*, that is pivoted at *10*, so as to bear uniformly upon the contacts *1* and *2*. This circuit-closer is operated by two spiral springs, *12* and *19*, and the push button *34*. Upon the sides of the case there are the catches, *31* and *26*. These catches are so arranged that it requires considerable pressure to release them, and thus when it is desired to open the circuit, pressure is made on the push button, *34*. When the pressure on the springs is sufficient to release the catches the piston, *6*, is driven forcibly forward and the circuit quickly broken. When the push button is released the operation is reversed, and the circuit quickly closed.



IMPROVED TELEPHONE SYSTEM.

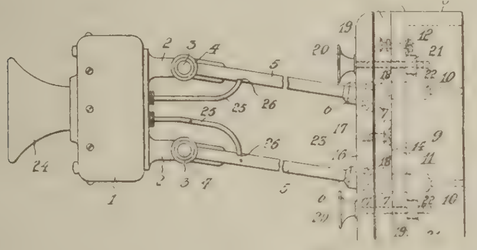
William W. Dean, of Chicago, Ill., patents (No. 746,040) and assigns to the Kellogg Switchboard and Supply Company, an improved common battery switchboard circuit. The object of this invention is to secure a two-wire switchboard circuit that is simple of construction and positive in operation. The figure shows a diagrammatic representation of the invention. *A* and *B* are two substations wired in the ordinary manner. These substations terminate in the jacks *j* and *j'* at the central office. A cut-off relay *r*, is provided, which differs from the ordinary relay in being a polarized relay. There is also the line signal relay *r'*, the line signal lamp *S*, and the battery *B'*. When the subscriber removes his telephone from the hook, current flows from the positive side of the battery *B'*, in the direction of the arrow, through conductor *1'*, to the substation, returns by the conductor *12*, excites the relay *r'*, and lights the signal lamp *S*. Under these circumstances the cut-off relay *r* does not operate, because it is polarized in such manner that a current flowing in the direction of the arrow will not attract the armature. The cord circuit *C* con-



tains the answering plug P and the connecting plug P'. There is also the battery $B2$. Both sides of the cord circuit are opened by the condenser C', and on each side of the cord circuit are the supervisory relays $r2$ and $r2$, and $r3$ and $r3$. When the plug P is inserted in the jack j, current flows from the positive of battery $B2$, through relay $r3$, to conductor S, thence to the sleeve of the plug P, thence through the cut-off relay r to the ground g, and back to the negative pole of the battery $B2$. This current reverses the current of the battery B', operates the cut-off relay, and extinguishes the line signal. Also the supervisory relay $r3$ is operated and its contact closed. This would light the supervisory lamp $S2$ if it were not for the fact that current also flows from the positive side of the battery $B2$ to the substation j, thence through the tip spring of the jack j, thence through the relay $r2$, and to the negative side of the battery $B2$. Or while the relay $r3$ has its contact closed the relay $r2$ is excited and its contact opened. Therefore, the supervisory lamp $S2$, is not illuminated. As soon as the subscriber hangs up the current through the tip side of the cord circuit is broken, the relay $r2$ de-energized, and the contact of the supervisory lamp $S2$ closed. This lights the supervisory lamp and informs the operator that the subscriber has replaced the telephone.

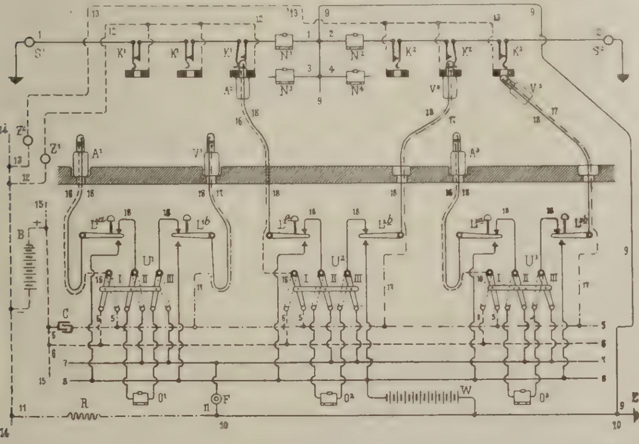
IMPROVED TRANSMITTER SUPPORT.

August Gamache, of East Clifton, Canada, patents (No. 745,049) an improved transmitter support. This is shown in the figure. There is a base plate *8* to which two arms *5 5* are pivoted by means of the swinging joints *18*. These arms extend and are connected to the transmitter by means of two similarly pivoted hinges *3 3*. By this means the transmitter may be adjusted to any desired height, and at the same time held vertically.



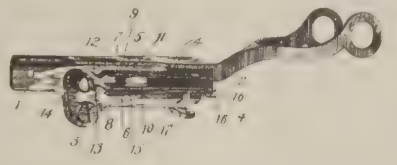
TELEPHONE SYSTEM.

George Ritter, of Stuttgart, Germany, patents (No. 745-388) an improved switchboard circuit. This invention relates to improvements in registers for denoting the number of messages which have been sent from any substation, and its object is to provide a circuit in which the relay is automatically produced. This is shown in the figure. In this drawing S' and $S2$ are respectively two substations which are connected with the multiple jacks K' and $K2$. At the central office there is a meter or register $Z1$ and $Z2$, each of which is connected to the rings of the respective jacks. These registers are in circuit with the negative pole of the battery B. The positive pole of the battery B extends through conductors *15*, *5* and *6* to the contact levers to the circuit changers U', $U1$, $U2$ and $U3$. By moving these contact levers to the left the operator is able to test any desired line as may be easily traced from the circuit. By moving the levers to the right the meters $Z1$ and $Z2$ are placed in circuit with the battery, and as these meters are electromagnetic devices, a call is recorded every time that a connecting plug $V1$, $V2$ or $V3$ is inserted in the jack of a called subscriber.



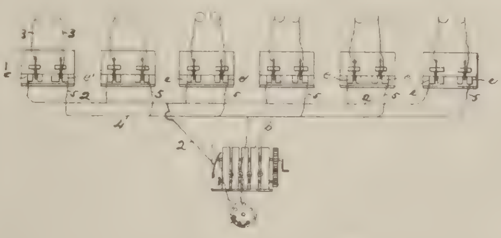
IMPROVED HOOK SWITCH.

N. A. Engstrom, of Chicago, Ill., patents (No. 746,314) and assigns to the Stromberg-Carlson Telephone Manufacturing Company an improved hook switch. This is illustrated in the figure. The object is to provide an improved hook switch having more substantial springs, better contacts, and more economical of manufacture. The inventor provides a base plate *1*, upon which the hook switch *2*, is pivoted at *5*. The hook switch casting carries a pin *14*, surrounded with a roller of insulated material. This roller is adapted to operate the springs *12* and *13*, that carry contacts adapted in any well-known manner to any desired substation.



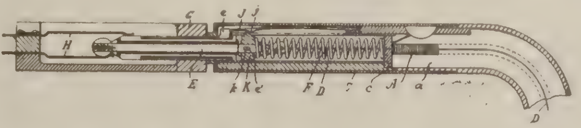
SELECTIVE TELEPHONE SYSTEM.

Amos Gagnon, of Stafford Springs, Conn., patents (No. 746,065) a method of selective signalling for party line stations. This invention is shown diagrammatically in the figure, in which six stations are represented. The inventor provides a magneto generator for ringing current B and a rheostat C. The bells at each one of the substations are wound to different resistances or proportioned in conjunction with the rheostat C that each bell will respond only when rung through one of the resistances in the rheostat. By this means, when a party is to be called the operator sets the rheostat for the resistance allotted to that party and then rings. Under these circumstances only the bell which is wound for the resistance selected by the operator will respond.



IMPROVED SWITCHBOARD CORD.

Frederick Francis, of London, England, patents (No. 745,341) an improved switchboard cord. This invention is shown in section in the figure, in which the springs and the jack are represented at H. The cord is supplied with a kind of a casing, a, which is relatively rigid. The plug is supplied with a spring, f, that is inside of the cord casing. When the operator puts up a connection she forces the plug into the jack against the tension of the spring, f. The friction of the jack springs holds the jack in its proper place. Through the center of the cord casing there is a wire or string, d. If the operator gives a jerk to the string, d, the pull produced is sufficient in connection with the spring, f, to retract on the plug through the jack, and the cord falls to the cord shelf, and by means of the cord weight is retracted to its proper place.



The Week's Messages.

FINANCIAL.

POMONA, CAL.—A meeting of the Pomona Valley Telephone and Telegraph Company will be held here January 4 to consider the question of creating a bonded indebtedness of $20,000 to provide funds for extending the service.

BUSHNELL, ILL.—A. B. Cooling has sold the Bushnell Telephone Company to F. B. Hopkins.

CHICAGO, ILL.—It is officially announced that the Automatic Telephone Company of this city will increase its capital stock from $3,000,000 to $5,000,000.

HAMBURG, IA.—W. F. Rankin, of Tarkio, Mo., has purchased $10,000 worth of stock in the Southwest Iowa Telephone Company, recently organized here.

SHENANDOAH, IOWA.—The Independent Mutual Telephone Company has declared a semi-annual dividend of 5 per cent. Nine hundred subscribers are connected with the local exchange.

FAIRHAVEN, MASS.—The Co-operant Telephone Company, which has systems in Fairhaven and Whitehall, is asking for franchises in several of the larger towns in the State.

LINCOLN, NEB.—The Lincoln Telephone Company has filed a mortgage for $650,000, covering its entire plant.

PUNXSUTAWNEY, PA.—The Summerville Telephone Company held a meeting here recently and declared a dividend of 10 per cent.

STANTONVILLE, TENN.—The Stantonville Telephone Company has increased its capital stock from $3,000 to $10,000.

KENOSHA, WIS.—The Citizens' Telephone and Telegraph Company has increased its capital stock from $25,000 to $50,000.

MILWAUKEE, WIS.—The Badger Farm Telephone Company of Milwaukee has increased its capital stock to $50,000.

FRANCHISES

LONDON, ONTARIO, CANADA.—D. J. Leonard, manager of the Canadian Telephone and Telegraph Company, of Toronto, is in the city and will apply to the City Council for a franchise.

TORONTO, CAN.—The Canadian Telephone and Telegraph Company, recently incorporated, has applied to the City Council for permission to operate in Toronto.

YUMA, COL.—The City Council has granted a franchise to C. D. Picket and M. H. Spere for the purpose of constructing a telephone exchange.

NASHVILLE, ILL.—The Rixman Telephone Company, with headquarters at Richview, has been granted a franchise to operate a telephone exchange in this city.

PEKIN, ILL.—William H. Jones, W. King, W. H. Deinfohr and John H. Regnerson have applied for a franchise to erect a telephone line in Spring Lake Township.

BLOOMFIELD, IND.—William Hawkins, of Freeman, has asked the Town Council of Bloomfield for a franchise to construct a local telephone system. Mr. Hawkins already owns an extensive system in Owen, Monroe and Green Counties.

BURNSIDE, KY.—The City Council of Burnside will sell to the highest bidder a twenty-year franchise for the erection and maintenance of a telephone system.

BANGOR, ME.—The Bangor Automatic Telephone Company, recently incorporated, has applied to the City Council for a franchise. The officers are Charles F. Bragg, president; A. A. White, vice-president and general manager; James A. Boardman, treasurer and clerk.

SOMERVILLE, N. J.—The Board of Freeholders has granted the Hillsboro and Montgomery Telephone Company permission to erect its lines on the roads of the county.

NUNDA, N. Y.—The Rural Telephone Company has constructed a line in town and has installed one pay station. It proposes to apply to the City Council for a franchise to supply complete village service.

GREENSBURG, PA.—The Borough Council has granted a franchise to the Pittsburg-Johnstown Long Distance Telephone Company.

WHITE LAKE, S. D.—The City Council has granted a franchise for the construction of a local telephone system. Work will be commenced early in the spring.

NORTHFIELD, VT.—The Orange County Telephone Company has petitioned the village trustees for a local franchise.

POINT PLEASANT, W. VA.—The Elmwood Telephone Company is asking for a franchise for telephone rights in this city.

COMBINATIONS.

GIBSON CITY, ILL.—The Paxton Telephone and Telegraph Company has sold its Gibson plant to the business men of Gibson, who have organized the Gibson Home Telephone Company.

WILLMAR, MINN.—It is probable that the Diamond Lake and Harrison Union Telephone Companies will be consolidated at their annual meeting in January.

CHAPPELL, NEB.—Manager Lathrop, of the Independent Telephone Company, has sold a half interest in his business and contemplates extending his line next spring. One of the extensions will be from Julesberg to Lewellen.

JAMAICA, L. I., N. Y.—The Seaboard Telephone and Telegraph Company has been sold to capitalists of New York City, who are said to represent the interests of the New York and Long Island Telephone Company. The Seaboard Company is incorporated with a capital stock of $60,000 and the following officers: Dr. Carl Schmuck, of Lawrence, president; John Adikes, of Jamaica, vice-president; S. R. Smith, of Freeport, treasurer; Andrew McTigue, of Far Rockaway, secretary.

COOFERSTOWN, N. D.—William Glass has purchased the majority of stock of the Union Telephone Company.

PERSONAL.

F. W. DUFFIE has been appointed general superintendent of the Northwestern Telephone Company's business at Gouverneur, N. Y.

C. E. NICHOLAS has resigned as manager of the Kenton, Ohio, Telephone Company. The resignation is to take effect on January 1, when Mr. Nicholas will leave for a short stay in Columbus, after which he will go to Rochester, where he will make his headquarters in looking after the manufacture of his recent patented telephone selecter. A company has been incorporated which will have charge of this patent, and indications point to there being most flattering returns from it. Mr. Nicholas has also formed another company, of which he is president, which will manufacture his patent lightning arrester. This also promises most successfully. With various members of his company, Mr. Nicholas exhibited these patents at the Inter-State Convention.

ELECTIONS.

BLOOMINGTON, ILL.—At the annual meeting of the McLean County Telephone Company the following officers were elected: F. Y. Hamilton, president; B. F. Garver, Farmer City, secretary and treasurer; E. C. Martens, general manager. A dividend of 7 per cent was declared. Considerable improvements and additions were discussed, and the completion of the lines to Lincoln was decided on.

FOSTER, ILL.—The German-American Telephone Line has elected the following officers: Dr. Bendle, president; Thomas Watson, vice-president; F. W. Mewes, secretary, and Fred Feldman, treasurer.

CRAWFORDSVILLE, IND.—The Co-operative Telephone Company has elected the following directors: Samuel Fraley, George W. Bowers, Charles Beck, W. H. Nicholson and M. E. Clodfeler.

THE WEEK'S MESSAGES—Concluded.

LA GRANGE, IND.—The North Indiana and Southern Michigan Telephone, Telegraph and Cable Company has elected the following officers: Frank J. Smith, president; M. L. Johnston, vice-president; W. H. Winship, secretary, and A. H. Ellison, treasurer.

MARSHALL, IND.—The Citizens' Telephone Company has elected the following officers: Anderson Teague, president; Henry Myers, vice-president; Samuel Hadley, secretary and treasurer.

BEDFORD, IOWA.—The Bedford Telephone Company held a meeting here recently and elected the following officers: H. L. Ash, president; John C. Beauchamp, secretary and treasurer. In addition to these two, Ira Green completes the board of directors. The company was incorporated December 5, 1902, with a capital stock of $15,000.

CLINTON, IOWA.—The De Witt Telephone Company has elected the following officers: T. W. Large, president; J. G. Pearse, vice-president; C. H. Arthur, treasurer. A dividend will be declared January 1, and it is the intention of the company to extend its lines in the spring.

IOWA CITY, IA.—The directors of the rural telephone lines of Johnson County held a meeting here recently and elected the following officers: J. W. Justice, of Sharon, president; J. W. Morford, Graham, vice-president; T. F. Fountain, Tiffin, secretary.

PARKERSBURG, IA.—The Parkersburg Telephone Company has elected the following officers: James Gardiner, president; Mr. Shoemaker, vice-president, and Robert F. Camp, secretary and general manager.

WEST PARIS, ME.—The Curtis Hill and Paris Telephone Company has elected the following officers: F. H. Packard, West Paris, president; Alton C. Wheeler, South Paris, vice-president; Freeman Wyman, South Woodstock, treasurer; William H. Lurvey, Woodstock, clerk.

READING, MICH.—The Reading Telephone Company has elected the following officers: F. R. Galloway, president; M. H. Wood, secretary-treasurer. It was voted to increase the capital stock from $2,500 to $5,000.

HOKAH, MINN.—The Hokah Telephone Company has elected the following officers: J. H. Klein, president; William Guenther, vice-president; W. S. Moe, secretary, and George J. Hoffman, treasurer.

MOUNTAIN LAKE, MINN.—At the annual meeting of the North Star Telephone Company, of Mountain Lake, the following officers were elected: Solamon Balzer, president; Frank Balzer, vice-president; J. H. Dickman, secretary and treasurer. J. D. Schroeder, the efficient general manager, was re-engaged. In addition to these the board of directors also includes C. C. Quiring. The motion was carried to induce farmers to buy stock for necessary extentions next spring. Farmer rates are $15 a year, and if a farmer takes $100 or more of stock his telephone rental will be only $12 a year. The company has had a very prosperous year and looks forward to practically doubling its capacity during the coming year.

NEW MELLE, MO.—The New Melle Telephone Company has elected the following officers: A. C. Hoefner, president; J. H. Meier, Jr., secretary and treasurer.

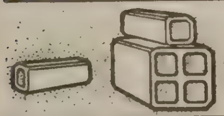
WAYLAND, N. Y.—The Wayland Independent Telephone Company has elected the following officers: Alexander Engel, president; Jacob F. Sohn, vice-president; Nicholas Schu, Jr., secretary and treasurer; Dr. G. M. Peabody, superintendent, and George F. Whitman, manager.

MISCELLANEOUS

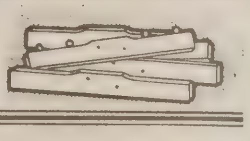
WHITING, IOWA.—The Independent Telephone Company lost $1,000 worth of its property by fire here.

PHILLIPSBURG, KAN.—The Downs Western Telephone Company have purchased a building at Phillipsburg and will remove their central office the first of the year.

BOSTON, MASS.—The Bell Telephone Company, the New England Telephone Company and the National Bell Telephone Company have been on their own petition, dissolved as Massachusetts corporations by Judge Hammond of the Supreme Court. The ground of the petition was that they are not now engaged in business, having been superseded by a corporation or corporations organized under the laws of another State. The Bell Company was organized July 30, 1878, with a capital of $450,000; the New England Company February 12, 1878, with a capital stock of $200,000, and the National Bell Company March 13, 1879, with a capital of $850,000.



New Construction in the Field



WRAY, COL.—The Wray Telephone Company is extending its line from St. Francis, Kan., to Atwood, Kan.

ROCKFORD, ILL.—The Home Telephone Company will extend its toll lines to Freeport early in the spring. Rural lines will be constructed along the main streets throughout the country.

ALBERT CITY, IOWA.—The German-Swede Southern Telephone Company, Albert City, has recently completed a network of lines in that section for a rural country party line telephone system. The system is constructed with lines of the most substantial character possible, and is equipped throughout with strictly long-distance telephones of the "International" bridging type.

CHEQUEST, IA.—The Chequest Farmers' Telephone Company held a meeting recently and decided to construct a new line to Lebanon.

BRAZIL, IND.—The Citizens' Telephone Company will add to its switchboard and make other improvements which will cost fully $5,000.

SPENCER, IOWA.—The Citizens' Telephone Company, which was granted a franchise through a special election last spring, has arranged to install an exchange at once.

GARDEN CITY, KAN.—The Garden City Telephone Company will install a 200-drop section in its switchboard. It will extend its lines from this city in all directions.

MANKATO, MINN.—The Minnesota Valley Telephone & Telegraph Company, of which Walter L. Haskel is general manager, is extending its toll lines to Windham.

MADELIA, MINN.—The Madelia Telephone Company, recently organized, has been giving service for several months with 135 telephones. It has brought the opposition down from 75 telephones to 10. It is now constructing several farmers' lines.

NORTHFIELD, MINN.—The Northfield Telephone Exchange Company will install a central energy switchboard in its local office.

ROCHESTER, MINN.—The Rochester Telephone Company and the Elgin Telephone Company will jointly construct a line from Haverhill Township in to Rochester.

ST. PAUL, MINN.—At the annual conference of Northern Pacific division superintendents, the extension of the use of the telephone in the operation of the road was discussed. The company has now 900 miles of telephone wire.

ST. LOUIS, MO.—The Kinloch Telephone Company is constructing a line to Portage des Sioux.

BIG TIMBER, MONT.—A movement is on foot to establish a rural telephone system among the ranchers residing between Big Timber and Melville.

BASSETT, NEB.—The stockholders of the Bassett and Spring View Telephone Company have increased the company's capital stock to $25,000 for the purpose of constructing many new lines next spring.

STANTON, NEB.—G. C. Merritt, president of the Western Engineering Company, has made the city a proposition to install an Independent telephone system.

TRENTON, N. J.—The Inter-State Telephone Company will construct a new trunk line between Bridgeton and Salem.

CORY, N. Y.—Horace Greeley is securing rights-of-way for a telephone line between this city and Clymer.

DEPOSIT, N. Y.—Attorney C. E. Scott, manager of the Deposit Telephone exchange, will install a new system.

EMERADO, N. D.—The Emerado Telephone Company has completed its system here, and will extend a line to Mekinock early in the spring.

BELLEVUE, O.—Mr. Callaghan, president of the Local Telephone Company, was in Norwalk recently, arranging for overhauling the company's plant in Norwalk.

ST. MARYS, OHIO.—The directors of the St. Marys Telephone Company held a meeting recently and decided to begin at once the construction of rural lines in every direction from town.

LE RAYSVILLE, PA.—The Wyalusing and Camptown Telephone line will be extended to Herrickville.

SHEAKLEYVILLE, PA.—T. B. Marsteller, of Sheakleyville, is perspecting for the construction of a telephone line between Sheakleyville and Greenville.

ALPENA, S. D.—The Alpena Telephone Company has nearly completed its local system. Several new rural lines are projected and a number of new telephones will also be installed. The officers of the company are: J. M. Johnson, R. F. Dey and A. F. Smith. A. F. Pinard, of Warthington Springs, is construction manager.

CENTERVILLE, TENN.—It is probable that a citizens' telephone company will be organized here, because of the fact that the Cumberland Telephone Company is refusing to carry out its agreement with the citizens.

TRADE NOTES

The American Conduit Company, New York, Chicago and Los Angeles, has supplied the Columbia Telephone Company, Hudson, N. Y., with fifty-eight thousand feet of its bituminized fiber conduit. In a neat prospectus issued by the Columbia company, the following paragraph tells why it decided to use the American Conduit Company's product:

"After making a thorough investigation of the different conduits, we decided upon the bituminized fiber as preferable to the vitrified clay, points in its favor being, it is electrolysis-proof, moisture-proof, non-corrosive, and will stand an insulation test of 66,000 volts with safety. While more expensive than the clay, we anticipate better results."

The Central Telephone and Electric Company, of 909 Market street, St. Louis, Mo., has issued its catalogue No. 18. A little quotation from its preface will tell what the compilers of the catalogue intend to do. "It is our aim," they say, "to place in the hands of our friends and customers a catalogue that will show the progress of construction of our goods and furnish at the same time a few illustrations of the buildings to be used for exposition purposes at the World's Fair, which will be held in St. Louis during the summer of 1904." They aimed well. Twelve half-tone reproductions are given of different World's Fair buildings, and many types of switchboards and telephones, apparatus and sundries are shown. The company will be glad to send a copy of the catalogue upon request.

The H. B. Camp Company will manufacture the single duct conduit which the National Fireproofing Co., whose New York offices are in the Broadway-Maiden Lane building, has secured the contract for supplying the material to be used in the telephone and telegraph systems in Brussels, Belgium. The contract was secured through G. Ernest Woodman, 27 Chancery Lane, London, E. C., who represents the interests of the National company on the other side. Mr. Woodman is a partner of James F. Cummings, who is now in St. Petersburg laying the conduit, manufactured at the Raritan, N. J., plants of the American Vitrified Conduit Co., (controlled by the National Fireproofing Co., of Pittsburg). This conduit is especially made from the specifications of the engineer of the St. Petersburg Municipality. It is of two ducts, the holes being square and especially large. About 1,500 tons have already been shipped. A further contract is expected to be received shortly.

The International Telephone Manufacturing Co., Chicago, has greatly extended its manufacturing plant, adding to its complete line of improved central energy multiple trunking switchboard equipment a full line of generator apparatus.

It has completed the manufacture, under its own supervision, of a full set of special tools and machinery for making every distinct part from the crude material of its new patented self-restoring drop generator-call switchboard system. It has installed a number of these equipments and is having a large demand for this new line of apparatus and has, within the past 30 days, secured orders for the complete central office equipments for 17 exchanges, aggregating more than 4,000 lines, which, together with the increased demand for its special long distance country party line and village exchange telephones, has increased its business over 500 per cent. above any month since last spring.

The "International" board, it is said, contains many new features of merit and is one of the most substantial and reliable equipments of its kind on the market.

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